



ANNUAL REPORT

of the

WATER DEPARTMENT

CITY OF ASHEVILLE

Year Ending June 30, 1940

ASHEVILLE
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Sept. 20, 1940

Mr. P. M. Burdette

City Manager

Asheville, N. C.

This is the first annual report submitted by the Water Department in recent years. For the sake of continuity of records and comparison with the progress made in previous years, it is deemed essential that a report of the operations of the department be compiled each year.

The fiscal year beginning July 1, 1939 and ending June 30, 1940 was unusual in many respects. The year started auspiciously for the reorganized department with nearly normal rain fall, over-flowing reservoirs and increasing revenues. There followed, however, a series of misfortunes which harassed the department throughout the year. The severe drought, serious fires and unprecedented cold caused unanticipated expenditures of many thousands of dollars, yet

the year came to a close with net revenues greater than those of any recent year.

REORGANIZATION

At the beginning of the year, a general superintendent was appointed to have supervision over the entire Water Department. This move was made in line with the policy of nearly every other city water department and practically every business firm. It is a step endorsed by the National Board of Fire Underwriters, by consulting engineers and by other leading business men. Previously, the three principle divisions of the Water Department ---Administrative, Maintenance and the Water Sheds ---operated under separate superintendents. The reorganization should result in closer co-ordination of all divisions of the department.

OFFICE PROCEEDURE

A careful study has been made of the business methods, the records, and accounting procedure carried on by the department. The study includes comparison with the methods followed by other cities of comparable size. It was found that the method of billing, collecting, bookkeeping and accounting had been simplified about two years ago so that the present system is equal to, if not superior to the system employed by any of the other cities studied. Consequently, only comparatively minor changes were necessary. These changes involved the individual duties of employees, a small reduction in the office personnel and general "tightening up" of the office routine.

After a years work, the entire department is now operating in a highly efficient manner. The principle objectives may be summarized as a determin-

ation to furnish even better service, obtain more revenue and gain more good-will. Since it is axiomatic that a business does not stand still, it is our resolution that this business shall grow. We do not propose to rely on our monopoly, or the excellent natural resources or the advertised purity of our water. Instead, we will make an effort to sell more water both to city and county consumers. A special effort will be made to encourage the large consumers, such as Beacon Manufacturing Co., to use more city water in their processes. It is planned to keep the entire system in such condition that it may be readily adapted to meet the growing demand of our consumers.

In the office of the Water Department, an almost unbelievable amount of routine work is required in the billing and collection for all the accounts in the city and county.

BEE TREE SPILLWAY



Looking upward from lower end.

A list on the following pages shows the total number of operations, together with the average per day, required in completing the billing and collecting of accounts during the year. It will be noted that, for example, there were 150,752 water bills addressed in one year. Two city meter readers went to and read 135,264 meters in one year. Besides that, the county meter readers visited and read 25,488 meters in one year.

These and many other items which are listed on the table illustrate the necessity for machine-like routine in the Water Department Office.

REVENUES AND OPERATING COSTS

In order to illustrate the increase in revenues during the past four years, a chart showing the total revenues, the net revenues and the cost of operation of the department is shown on a following

page. It will be observed that the operating cost is only about 19 per cent of the total revenue. This unusually favorable condition is brought about largely by the natural purity of our water which makes costly treatment unnecessary and by strictest economy of operation as well as the fact that the supply is brought to the city by gravity without the necessity of pumping costs.

A second chart illustrates graphically the increase derived from the water sales and the total revenues of the department. It will be noted that the total revenues of the year ending June 30, 1938 increased approximately \$3,000.00 over the previous year. Another increase of nearly \$3,000.00 was made in the year ending 1939, but a gain of approximately \$22,000.00 was made during the last fiscal year.

A third graph shows the total revenue from the sale of water and meter rentals by months.

during the past several years. From casual examination of the graph, it appears to be merely a jagged line. This is due to the highly seasonal nature of the demand for water in Asheville. Closer examination of the graph will show, however, that the jagged line is gradually rising. This indicates clearly that the business is gradually expanding and that we may hope for continued increases, unless some unanticipated unfavorable circumstance causes a reverse. There are a number of factors which will govern the amount of increase we may reasonably expect.

SALES INCREASES

Principal among these factors are, first, climatic conditions, second, general business conditions, third, the acquisition of new industrial consumers, and fourth, our ability and willingness

BEE TREE RESERVOIR



Looking northward from intake tower.

to furnish additional capital for system extensions. The first factor, climatic conditions, is doubly important because long, hot, dry seasons greatly increase the demand for water and also encourage many more tourists to rush to the mountains from the less favored sections in search of relief from heat. The number of tourists in turn effects the second factor, general business conditions.

When general business conditions improve, the utilities all prosper. The water business, too, moves forward because practically every business operation is dependent to some extent upon water directly or indirectly.

The importance of the third factor, new industrial consumers, is apparent when we consider that one such consumer, Beacon Manufacturing Co., alone accounted for about fourteen per cent of the increase in sales this year. Our rates in the

upper brackets should be attractive to the large customers.

The fourth factor, capital for extension of new lines, is one of the essential elements in increasing the number of consumers in the county and some parts of the city. Petitions and requests are received frequently for water service where no mains are available. Investigation often proves that the number of new consumers, who will be served by the new line, will produce a profitable revenue for a comparatively small investment.

WATER DEPARTMENT ACCOUNTS

The Accounting Department has compiled the figures shown on the following pages covering the operating expenses and revenues for the Water Department for the past year. The difference between the gross revenues and the total operating expenses is shown as

the "net revenues". This sum, \$321,054.49, must not be considered the net profit of the department because there are many expenses and credits which have not been included in the totals shown.

In order to have a clear and complete accounting of the operations of the department, many other charges and credits should be made. The cost of amortization of the outstanding bonds is as much a part of the cost of running a business as the payments for labor and materials. No charge is made for the rental of office space, including heating, lights, telephone, janitor service and other incidentals.

The pro rata cost of insurance is not shown as part of the years operating cost. The services of the Accounting Department in keeping control accounts, making audits and providing other services is not added to the expenses. The

BEE TREE SPILLWAY



Looking downward from upper
section.

services of the Engineering Department in making surveys, preparing drawings and estimates is not charged to the water department. These expenses and many other overhead charges might be properly included as a part of the cost of operating the Water Department.

Besides the charges briefly outlined above, there is another important account which should be set up. An allowance should be set aside each year for depreciation, obsolescence and extensions to the system, the total value of which is in excess of five million dollars. Practically all other utilities set aside a sum sufficient to provide for these items. In our case, the sum of \$35,000.00 annually would not be excessive to cover these items. If such a sum is set aside, it will obviously reduce the amount of contribution to the operating fund but, if it is not set aside, the time will come

when the system will have depreciated and both the water supply and distribution system will be inadequate to supply the demands of our growing population in the city and county. Besides being exempt from all of these charges, the Water Department is exempt from property taxes, franchise taxes and many other forms of taxation which comprise a considerable part of the cost of operating other public utilities.

On the other side of the ledger, there are credits to partially offset the charges mentioned above. The Water Department furnishes almost unbelievable amounts of free water to city parks and play grounds; to public buildings and institutions; to public fountains as well as water for the Fire Department in combating fires. The value of this free water should be credited to the Water Department if an accurate analysis of the fiscal operations of the department is to be shown.

The amount of free water furnished is all metered with the exception of that used by the Sanitary Department directly from fire hydrants for flushing streets and the water used by the Fire Department in fighting fires.

The value of the free water furnished is shown in the tables on the following pages. It will be seen that water valued at \$35,168.26 has been furnished. If this amount were added to the net revenues, a remarkable increase of approximately 30 per cent might be added to our contribution to the general fund.

ACCOUNTS RECEIVABLE

On the following page will be found a chart showing the rise in the accounts receivable during the year just completed. The chart is one to which we do not point with pride because it

shows a decidedly unfavorable trend. The accounts receivable have risen from \$47,277.46 to \$59,300.11. This represents an increase of \$12,022.65, or more than \$1,000.00 per month. This amount is not necessarily lost, however, because it is still on the current accounts and much of it is collectable. The water sales increased nearly \$21,000.00 while the accounts receivable increased \$12,000.00. There is always a lag between increased sales and the collections therefor. During the year, a real effort was made to keep the collections as nearly equal to the amount of water sales as possible. In spite of these efforts, the accounts have grown steadily larger but an even greater effort will be made during the current fiscal year to reduce these accounts receivable. New and firmer collection methods will be employed and it is hoped that the trend will be reversed.

Theoretically the accounts receivable may be reduced to a very small per cent of the gross sales because we are dealing in a commodity which no one can do without and we have a monopoly in its distribution. By following a more "ruthless" collection method, and discontinuing service of every consumer who does not promptly pay his bill, it might be possible to keep the accounts receivable at an absolute minimum but when such a policy is followed the public indignation becomes so great that the purpose is defeated. We must, therefore, choose a middle course and constantly press collections without interrupting the service any more than is necessary.

One factor which should tend to avert increases in the accounts receivable is a policy of requiring deposits by all new consumers. The collection of deposits, both from home owners and tenants,



Large gash in the mountainside made by Blue Ridge Parkway at Potato Knob, North Fork.



Power shovel and contractors equipment excavating for Blue Ridge Parkway on the water shed.

will tend to reduce losses considerably.

A chart showing the total amount of consumer's deposits shows that this account has steadily risen during the past year until there is now a total of \$39,436.20. Many of the consumers protest against paying a deposit yet we persist in the collection of these deposits because it is one of the best safe-guards against losses from bad accounts.

It is very difficult for some of the less fortunate consumers to make a deposit of \$5.00 at one time. To some of the negro consumers it represents an almost unsurmountable obstacle, yet they do, somehow, find a way to get together the required deposit either in partial payments or in a lump sum.

The consumer who is so destitute that he cannot make a deposit is referred to the County Welfare Department which investigates the case and makes recommendations regarding each individual. Since we

are without facilities for making a separate investigation, we are guided entirely by the report of the Welfare Department. During the year, a total of \$596.19 was paid by the Welfare Department for needy families.

DELIVERY OF WATER BILLS

This year, as in several past years, a large percentage of water bills are delivered by an employee of the Water Department instead of being mailed. This method results in considerable saving in mailing cost as shown on the tabulation on the following page.

It will be seen that a saving of \$936.82 was effected by hand delivery. The bills to the county consumers and to the city consumers in the outlying sections are mailed. The total cost of mailing and delivering all of the bills was \$2,052.40.

PRINCIPLE ITEMS OF OPERATION WATER DEPT. OFFICE JULY 1939-JUNE 1940

	AVERAGE PER DAY	TOTAL
Water Bills Addressed	523	160,752
New Meter Reading Records Made	436	13,396
Addressograph Plates Changed	18	5,400
Off and On Orders & Trans. Posted	25	7,800
Off and On Trans. Orders Executed by Cut off man	25	7,800
Meters read by City Meter Readers	441	135,264
Meters read by County Meter Reader	81	25,488
Bills Delivered by Hand	348	106,841
Bills made out by Billing Clerk	469	144,501
Customers contacted for payment of delinquent bills	29	10,800
Complaints adjusted and information given	107	32,976
Duplicate bills issued	43	13,200
Paid bills posted and assorted	356	109,702
Bills Collected and assorted by Cashiers	10,000	10,000
Envelopes stuffed with bills	471	144,501
Balances put on bills	236	72,252
Deposits Collected-Amt	37.85	11,622.50
Water Bills Mailed	122	37,660
Deposits Cancelled	23.20	7,121.66
Filing Cards Made	44	13,396
Bills Computed	13,396	160,752

*** R E V E N U E S ***
YTD DDLIO JUNE 30, 1946.

CODE	DESCRIPTION	ESTIMATES REVENUES	REALIZED	UNREALIZED
600	Cut On and Cut Off Fees	500 00	267 00	233 00
601	Rents-Meters	14 350 00	14 527 12	177 12
602	Water Sales	361 000 00	381 664 34	20 664 34
603	Service Connections	2 500 00	3 246 50	746 50
604	Purchase Discounts	75 00	71 93	3 07
605	Sewer Cleaning Fees	50 00	20 00	30 00
606	Sale of Material	50 00	120 69	70 69
608	Miscellaneous	100 00	147 60	47 60
609	Collections on Accounts			
	Previously Charged Off	25 00	23 40	1 60
	TOTAL	378 650 00	400 028 58	21 378 58
	TOTAL OPERATING EXPENSES			\$ 400 028 58
	TOTAL REVENUE EXPENSES			78 974 08
	NET REVENUES			\$ 521 574 29
	Contribution to Sinking Fund			\$ 200 000 00
	Contribution to General Fund			117 764 76
	Additional Reserve for Doubtful Accounts			5 175 72
				<u>\$ 321 674 42</u>

*** OPERATING EXPENSES ***
TOTAL BUDGET JUNE 30, 1940.

CODE	DESCRIPTION	ORIGINAL EXPENDITURES	EXPENDITURES 12 MONTHS	OVER EXPENDITURES
J				
1	Administrative			
	Salaries	18 390 00	18 928 00	538 00
	Requisitions	4 698 20	5 910 74	1 211 94
2	Watersheds			
	Salaries	7 940 00	12 659 31	4 719 31
	Requisitions	3 012 27	3 391 70	379 43
3	County System			
	Salaries	1 320 00	1 320 00	-0-
	Requisitions	374 40	374 40	-0-
4	Meter Maintenance			
	Salaries	2 224 00	2 440 40	216 40
	Requisitions	2 574 40	4 358 30	1 783 90
5	Lines, Hydrants and Sanitary Sewer Maint.			
	Salaries	13 600 00	17 885 80	4 285 80
	Requisitions	6 908 20	11 705 44	4 797 24
	TOTAL	\$61 042 07	\$78 974 09	\$17 932 02
	SUMMARY			
	Salaries	43 474 00	53 233 51	9 759 51
	Requisitions	17 568 07	25 740 58	8 172 51
	TOTAL DEPARTMENT	\$61 042 07	\$78 974 09	\$17 932 02

VALUE OF FREE WATER AND SERVICE IN DOLLARS

- PARKS AND PLAYGROUNDS -

	1940												Meter Rent	TCT/L
	1939 July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June		
McGormick Field	112.65	107.98	109.53	98.89	134.80	1.00	1.00	1.00	1.00	1.00	88.30	24.54	7.80	\$ 680.88
Memorial Stadium	99.78	86.10	52.10	45.31	1.00	1.00	87.09	30.63	30.30	30.46	38.71	47.13	7.80	557.41
Aston Park	88.53	88.17	80.61	66.17	54.26	35.41	12.20	19.11	22.59	12.41	19.86	33.10	24.00	555.00
Municipal Golf Course	95.80	102.70	99.85	108.73	106.33	92.31	82.20	65.06	75.45	80.62	82.10	104.28	7.80	1,103.00
"	10.31	4.29	5.07	4.29	6.05	1.00	1.00	1.00	1.00	1.00	3.24	6.50	2.16	46.00
"	2.19	4.02	2.19	2.71	5.82	1.00	1.00	1.00	1.00	1.00	1.00	5.82	1.20	29.95
"	7.17	7.40	8.75	6.95	6.27	2.97	1.00	1.00	1.00	1.00	5.82	11.78	2.16	63.27
"	29.80	26.30	33.43	28.81	31.78	33.27	33.43	15.14	52.37	37.39	36.73	33.76	1.20	393.41
"	28.98	24.54	27.86	32.43	36.24	21.29	30.46	29.64	30.96	13.78	32.11	32.28	6.00	375.57
"	4.55	5.82	4.55	3.50	4.02	1.30	1.00	1.00	1.00	1.00	2.45	6.27	6.00	42.46
"	3.24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	22.04
Rec. Park Swimming Pl.	458.93	329.88	155.35	1.00	1.00	1.00	1.00	1.00	1.00	1.00	417.93	426.85	54.00	1,859.94
Malvern Hills Pool	450.00	450.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	450.00	....	1,350.00
Plaza	37.06	39.21	32.61	35.25	33.27	33.10	31.62	24.15	23.18	24.35	23.76	24.35	6.00	367.91
Rhododendron Park	13.12	30.46	34.92	32.28	13.04	1.60	1.60	1.90	1.00	4.02	30.30	35.41	7.80	225.45
Tourist Camp	311.73	243.03	1.00	5.07	58.17	112.30	112.30	166.30	70.95	59.36	1.90	44.49	24.00	1,210.60
Newton Cemetery	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	13.20
Community Bath House	1.00	1.30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	13.50
Miniature Golf Course	2.71	3.76	2.71	2.97	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.90	1.20	23.75
Griffing Park	1.30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.19	1.60	1.20	15.29
City-County Plaza	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	24.00	36.00

TOTAL \$ 8,986.20

VALUE OF FREE WATER AND SERVICE IN DOLLARS

- PUBLIC FOUNTAINS -

	1940												Meter Rent	TOTAL
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June		
Pack Square Pool	755.65	740.20	717.18	708.78	718.78	720.25	505.30	391.30	367.45	383.80	404.73	490.83	24.00	\$ 928.25
Nacon Ave. Pool	80.85	55.88	62.49	73.76	76.23	58.97	1.00	1.00	1.00	1.00	1.00	37.23	1.20	451.61
Nacon Ave. Fountain	24.93	23.76	27.86	27.27	28.98	31.62	31.12	31.12	27.66	28.64	29.64	28.98	1.20	342.78
Montford Park	1.00	2.71	1.00	5.82	7.17	1.00	1.00	1.00	1.60	1.90	3.76	4.02	1.20	33.18
Montford Park	29.97	29.64	33.93	34.42	36.24	34.09	36.40	22.01	1.00	28.64	11.57	11.99	1.20	311.10
W. Pack Sq. Fountain	88.17	42.61	58.57	46.63	44.32	45.81	34.42	26.88	22.40	23.18	25.13	37.89	1.20	503.21
E. Pack Sq. Fountain	39.54	39.54	48.12	35.58	34.42	33.76	30.63	27.27	25.13	26.88	28.98	27.08	1.20	398.13
Otis Drinking Fountain	19.47	18.50	20.84	20.25	22.59	23.76	25.91	24.74	28.25	30.30	32.61	30.30	1.20	298.72
Petton & Haywood St. Ftn.	17.33	4.55	.10	33.10	37.39	3.50	25.52	21.62	17.91	17.91	16.70	7.85	1.20	204.68
Depot Drinking Fountain	28.81	26.49	31.62	28.98	29.47	23.57	27.47	23.96	19.47	24.15	19.67	22.40	1.20	307.26
Lexington Ave. Fountain	28.25	.....	24.15	25.13	32.61	35.08	19.86	14.30	12.62	16.16	27.27	26.69	1.20	263.32
Lexington Ave. Fountain	40.03	36.57	42.84	34.92	33.27	35.58	27.86	23.76	22.79	24.93	31.12	32.11	1.20	386.98
Market & Eagle St. Ftn	22.20	22.40	36.73	28.05	55.61	39.21	38.38	35.91	33.76	32.77	31.29	31.29	1.20	408.80
Fountain-Olney Rd.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	13.20
Haywood Rd. Fountain	32.28	32.94	33.93	31.95	36.73	35.25	32.11	16.94	22.98	26.30	27.27	36.07	1.20	365.95
Horney Heights Park	1.00	1.00	1.00	1.00	2.19	3.50	1.00	1.00	1.00	1.00	1.00	1.00	1.20	13.20
Montford Ave. Fountain	45.97	40.86	42.01	32.11	32.77	32.77	10.73	1.00	22.01	26.10	11.36	49.11	2.16	348.96
Pritchard Park	59.92	55.74	59.92	55.20	57.20	59.11	62.08	57.76	54.12	54.53	54.12	53.31	7.80	690.81
Horney Heights Park	110.20	123.18	104.73	65.59	83.33	1.00	1.00	1.00	1.00	36.57	51.29	84.48	7.80	671.17
N.Y.A. Project	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	13.20
W. Haywood St. Fountain	39.54	28.64	35.91	34.92	38.71	43.17	23.76	22.20	24.54	26.88	33.60	30.63	1.20	383.70
TOTAL														\$13,341.90

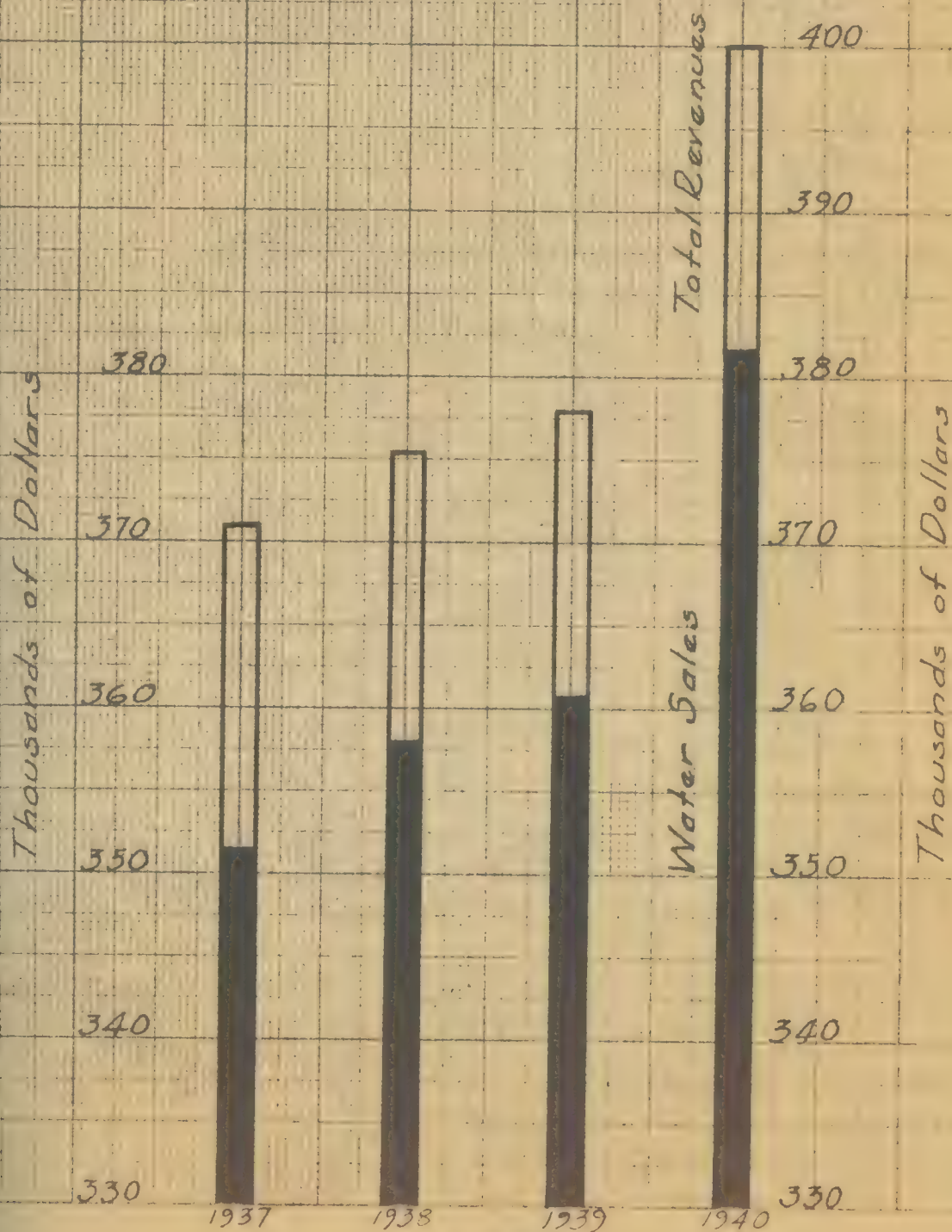
VALUE OF FREE WATER AND SERVICE IN DOLLARS

- CITY BUILDINGS AND INSTITUTIONS -

	1940												Meter Rent	TOTAL
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June		
Colored Comfort Sta.	4.29	1.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	\$ 17.39
City Garage	1.00	1.00	1.00	1.30	1.60	5.34	3.60	3.60	1.00	4.81	3.24	4.02	1.20	32.71
City Garage	26.69	6.50	8.07	25.13	22.79	20.06	20.45	20.45	21.62	23.18	19.47	22.40	7.80	244.61
City Hall	43.83	39.37	41.08	35.58	35.08	35.58	31.29	31.29	31.78	37.72	48.99	53.17	24.00	488.76
Comfort Station	35.91	84.21	83.33	77.25	74.73	75.00	44.65	42.01	40.86	45.15	37.56	35.08	2.16	677.95
Comfort Station	82.65	82.65	77.36	79.61	80.63	77.93	85.54	80.17	75.34	82.20	87.27	100.60	7.80	999.75
Library	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.80	19.80
Police & Fire Sta.	19.20	20.64	20.64	20.64	18.50	18.50	20.25	19.86	18.30	19.08	17.91	18.11	24.00	255.91
Merrimon Ave. Fire Sta.	25.91	24.93	20.84	19.28	20.06	19.47	21.03	21.03	15.14	17.52	18.50	22.01	7.80	253.52
Baltimore Fire Sta.	4.81	6.05	5.34	4.81	6.27	5.60	4.81	5.07	4.81	5.34	4.81	5.07	1.20	63.99
Bartlett St. Fire Sta.	5.82	5.34	6.50	5.82	6.50	6.02	5.60	5.60	6.05	6.05	6.72	6.05	1.20	73.27
W. Asheville Fire Sta.	23.57	23.96	28.98	27.86	31.29	32.28	27.86	35.41	30.79	32.44	38.71	32.77	1.20	367.12
Old Incinerator	2.97	2.97	2.97	1.00	10.31	5.82	1.00	1.00	1.00	1.00	4.02	6.50	2.16	42.72
New Incinerator	35.08	30.30	42.51	38.88	29.97	31.29	28.44	22.98	23.37	21.23	23.18	13.25	7.80	348.28
Detention House	4.81	4.81	20.84	11.15	12.20	13.46	13.46	12.83	13.25	13.04	9.65	1.00	6.00	136.50
Y.M.C.A.	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	6.00	73.20
Y.M.C.A.	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	15.00	82.20
Childrens Home	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	6.00	73.20
Mountain Orphanage	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	7.80	75.00
Auditorium	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.62	1.00	1.00	15.96	13.04	24.00	69.62
Colored Sewing Room	6.72	8.07	5.82	4.02	4.02	3.50	4.55	4.02	5.60	5.34	5.34	5.34	1.20	63.54
Orange St. School	183.85	171.63	181.53	106.08	7.62	3.76	8.07	8.07	3.50	10.12	11.15	1.00	2.16	698.54
Lindley Home	1.00	1.00	1.00	1.00	1.00	1.00	.....	.....	.....	.....	.....	.....	1.20	7.20
Lindley Home	19.08	11.36	3.50	1.00	2.45	1.60	1.00	1.00	.....	.....	.....	.....	1.20	42.19
F.E.R.A.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	13.20
Dave Bates	1.00	1.00	1.00	2.19	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	14.39
Rock Quarry	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	6.00	18.00
109 Engineers	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	13.20
TOTAL														\$5,265.76

TOTAL REVENUES & WATER SALES

Years Ending June 30, 1937-40

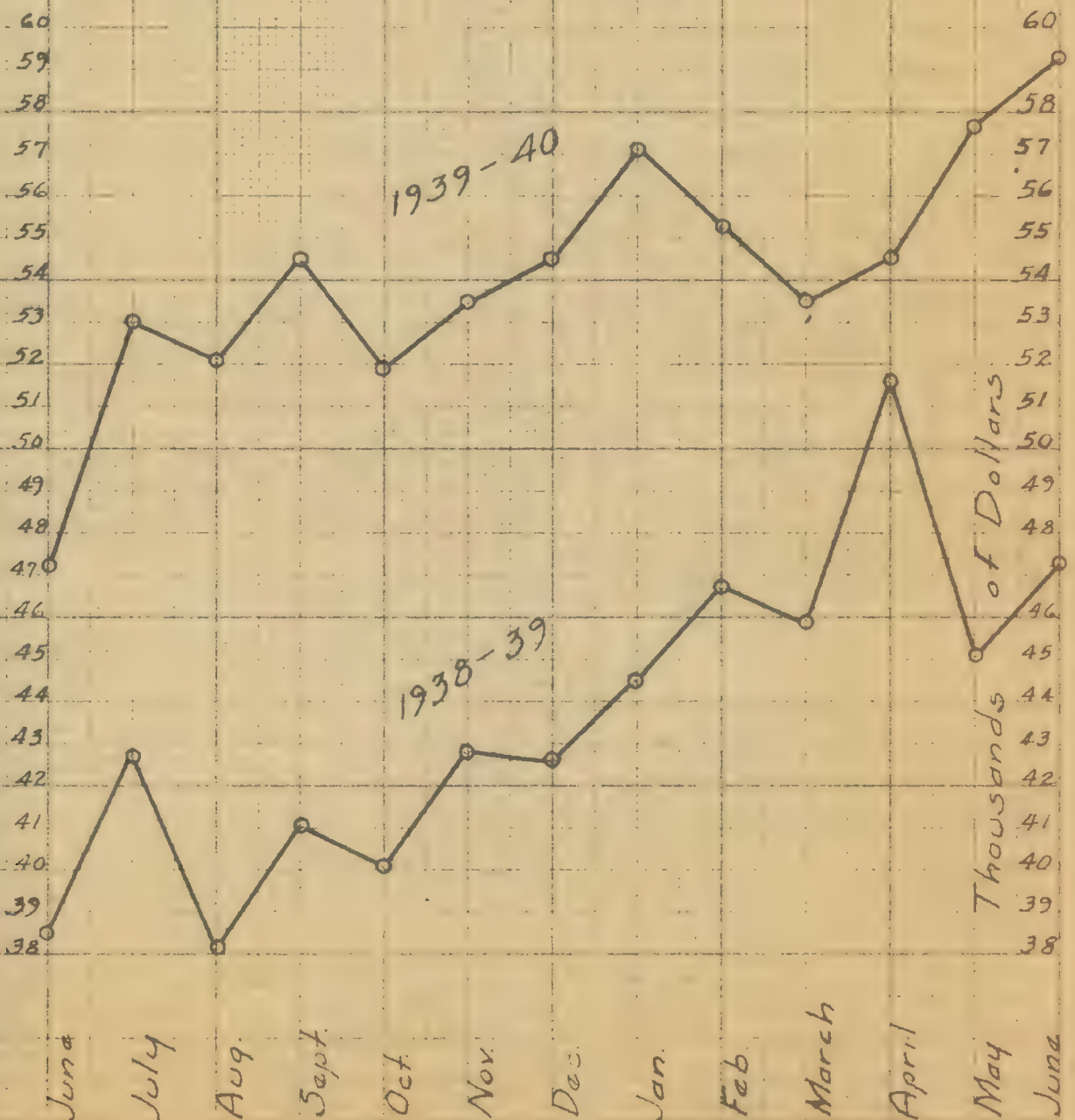


ACCOUNTS RECEIVABLE

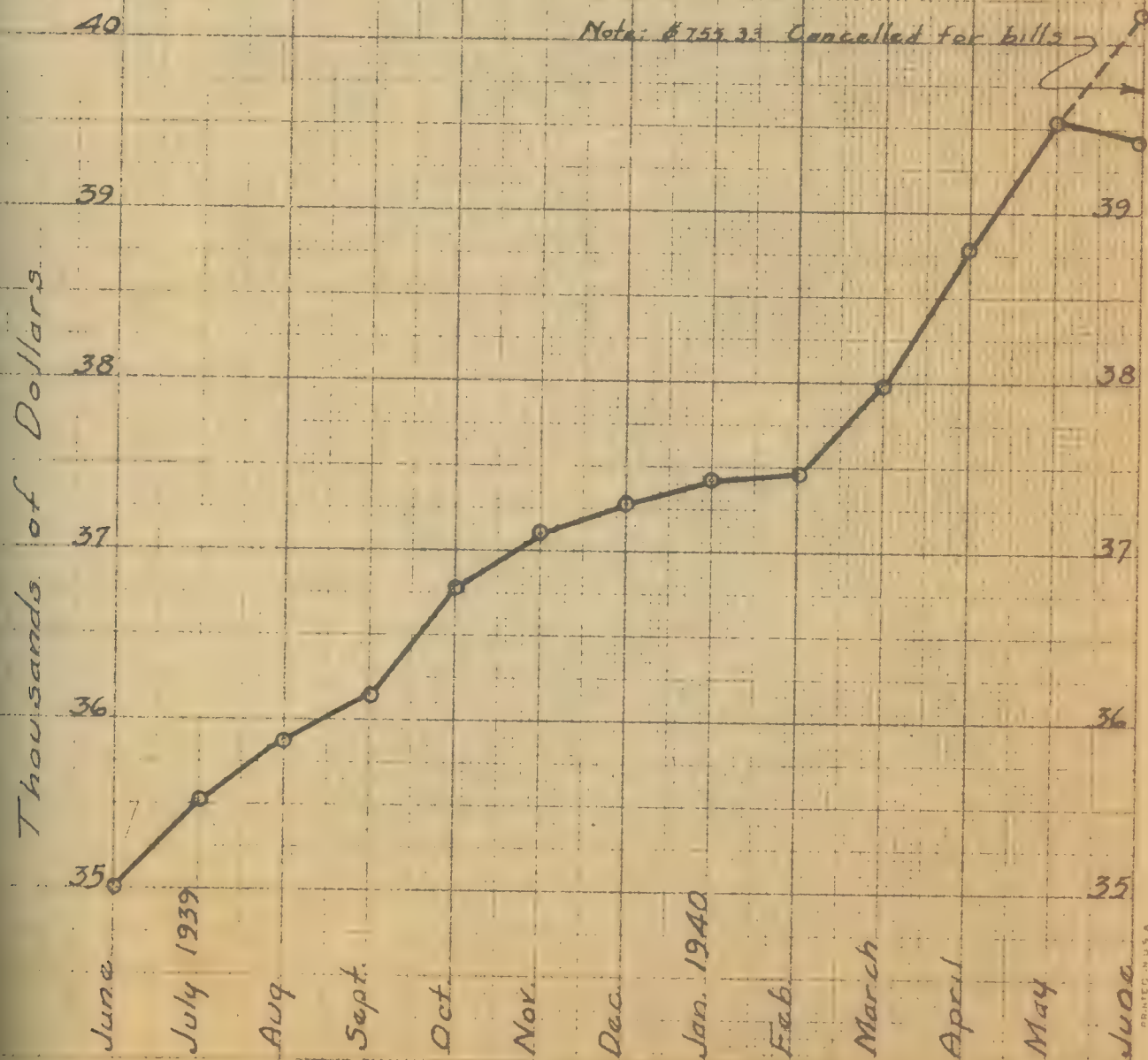
	<u>1938-39</u>	<u>1939-40</u>
June	38,471.55	47,277.46
July	42,727.79	53,003.48
August	38,054.24	52,105.36
September	41,034.47	54,488.99
October	39,067.46	51,997.14
November	42,831.99	53,448.11
December	42,627.28	54,510.99
January	44,510.95	57,130.28
February	46,749.27	55,331.27
March	45,958.70	53,490.96
April	51,628.54	54,480.73
May	45,184.40	57,749.10
June	47,277.46	59,300.11

ACCOUNTS RECEIVABLE

Years Ending June 30, 1939-40



INCREASE IN CUSTOMERS' DEPOSITS JUNE 1939 TO JUNE 1940



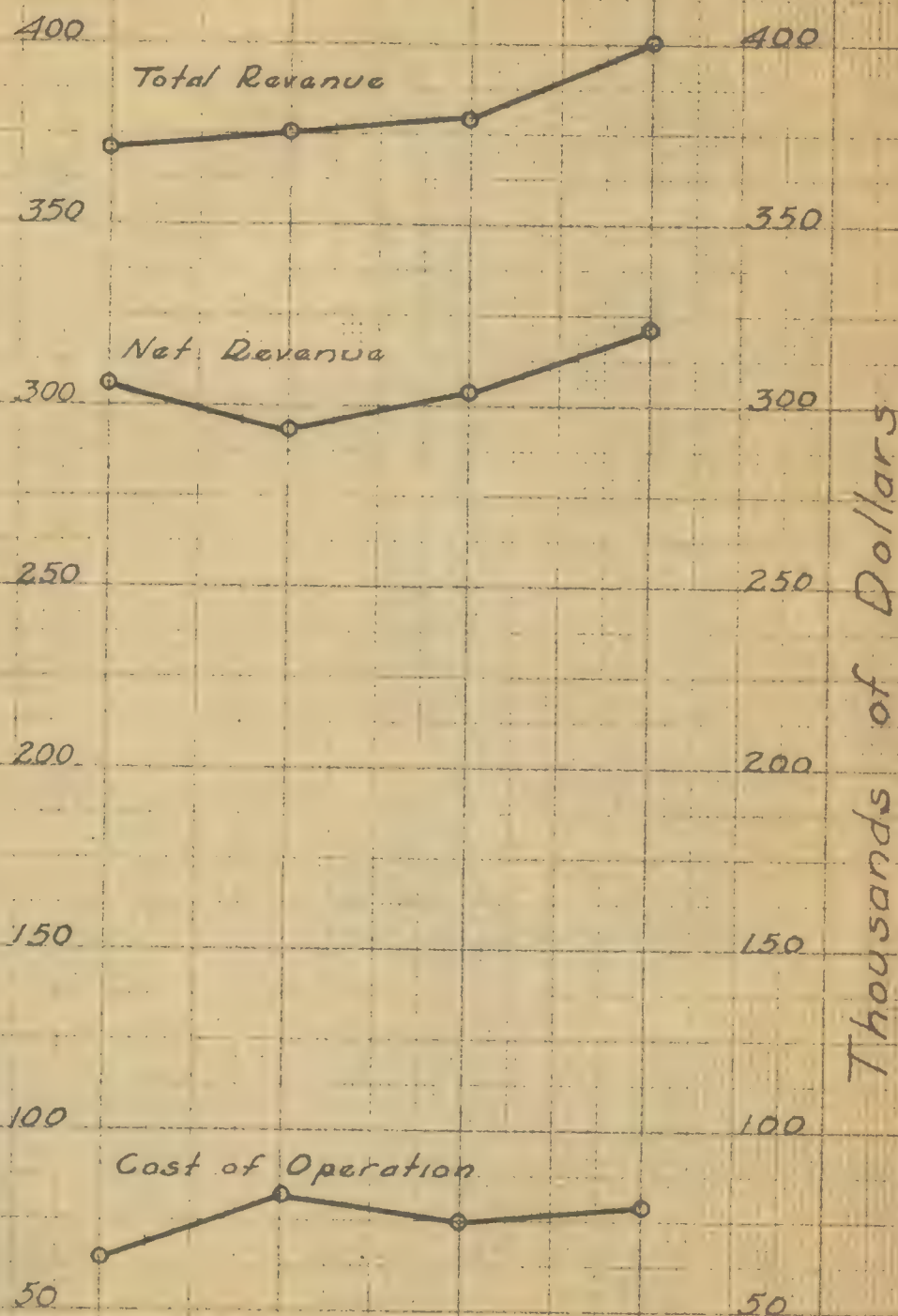
COMPARATIVE STATEMENT OF REVENUES AND EXPENDITURES

	YEAR ENDED 6/30/40	YEAR ENDED 6/30/39	YEAR ENDED 6/30/38	YEAR ENDED 6/30/37
REVENUES				
Water Sales.....	\$ 381 664 24	360 738 76	357 986 76	351 204 95
Rents-Meters	14 527 12	14 212 49	14 067 00	14 312 20
Cut Off and Cut On Fees	207 00	-0-	-0-	-0-
Service Connections	3 246 50	2 717 50	2 747 50	3 987 52
Miscellaneous	383 62	388 32	611 00	1 659 82
	\$ 400 028 58	378 057 07	375 412 26	371 164 49
Less Expense	78 974 09	74 997 80	81 756 13	64 462 50
NET REVENUES	\$ 321 054 49	303 059 27	293 656 13	306 701 99
DISPOSITION				
Contribution to Debt Fd.	\$ 200 000 00	200 000 00	200 000 00	200 000 00
Contribution to General Fd.	117 864 76	103 059 27	93 656 13	99 677 89
Reserved for Doubtful Accts	3 189 73	-0-	-0-	7 024 10
	\$ 321 054 49	303 059 27	293 656 13	306 701 99

GENERAL FUND BALANCE SHEET

	YEAR ENDED 6/30/40	YEAR ENDED 6/30/39	YEAR ENDED 6/30/38	YEAR ENDED 6/30/37
ASSETS				
Treasurers Balance	\$ 20 000 00	-0-	377 22	-0-
Accounts Receivable	59 300 11	47 277 46	38 471 55	54 999 37
Stores Inventory	10 643 54	9 987 25	9 815 34	9 835 43
	<u>\$ 89 943 65</u>	<u>57 244 71</u>	<u>48 664 11</u>	<u>64 834 80</u>
LIABILITIES				
Consumers Deposits	\$ 39 438 20	35 017 86	31 514 34	41 747 19
Accounts Payable(Trade)	3 191 05	2 106 69	1 590 74	811 06
Due to D.S. Fund	20 000 00	-0-	-0-	-0-
Due to General Fund	10 169 55	6 199 85	-0-	2 727 25
Surplus and Reserves	17 144 85	13 920 31	15 559 03	19 459 30
	<u>\$ 89 943 65</u>	<u>57 244 71</u>	<u>48 664 11</u>	<u>64 834 80</u>

REVENUES AND COST OF OPERATION



Years Ending June 30th
1937 1938 1939 1940

RECEIPTS FROM SALES OF WATER AND METER RENTALS

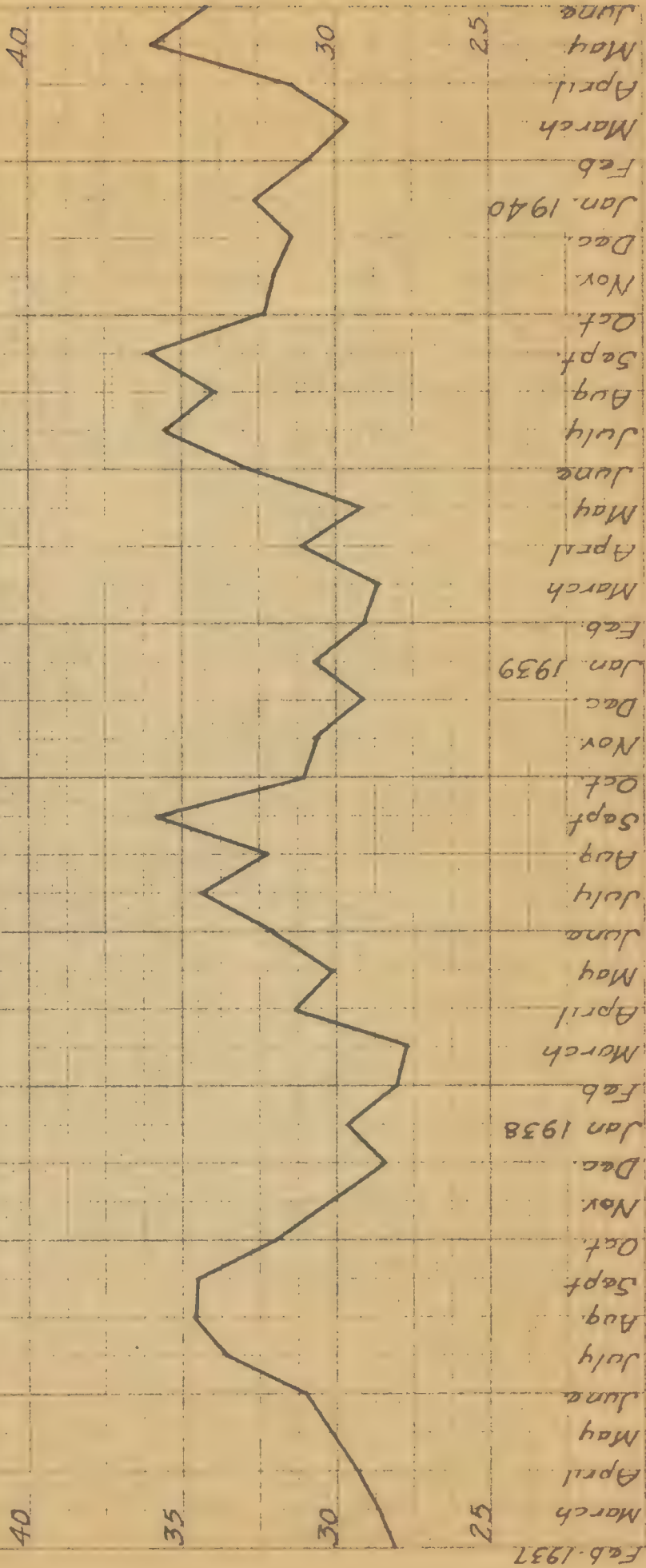
<u>1937</u>	<u>Consumption</u>	<u>Water Sales</u>	<u>Meter Rentals</u>	<u>Total Revenue</u>
January		\$ 28,949.70	\$ 1,156.89	\$ 30,106.59
February		26,488.05	1,147.98	27,636.03
March		27,469.39	1,155.56	28,624.95
April		28,139.55	1,142.95	29,282.50
May		28,979.24	1,169.46	30,148.70
June		<u>29,518.93</u>	<u>1,174.01</u>	<u>30,692.94</u>
		\$169,544.86	\$ 6,946.85	\$ 176,491.71
July		32,491.08	1,174.65	33,665.73
August		33,515.92	1,181.20	34,697.12
September		33,339.07	1,179.32	34,518.39
October		30,807.74	1,179.53	31,987.27
November		28,938.35	1,175.31	30,113.66
December		27,255.66	1,168.75	28,424.41
<u>1938</u>				
January		28,439.03	1,162.53	29,601.56
February		26,887.01	1,158.92	28,045.93
March		26,461.72	1,162.55	27,624.27
April		30,184.03	1,164.65	31,348.68
May		28,919.09	1,175.45	30,094.54
June		<u>30,841.16</u>	<u>1,184.14</u>	<u>32,025.30</u>
		\$358,079.86	\$ 14,067.00	\$ 372,146.86
July	207,123	33,264.07	1,191.20	34,455.27
August	196,132	31,068.69	1,178.32	32,247.01
September	221,309	34,619.23	1,195.97	35,815.20
October	169,255	29,810.72	1,189.16	30,999.88
November	168,312	29,505.75	1,183.00	30,688.75
December	154,384	27,953.11	1,177.29	29,130.40
<u>1939</u>				
January	158,109	29,521.66	1,178.41	30,700.07
February	151,119	28,186.00	1,174.74	29,360.74
March	144,971	27,482.09	1,176.37	28,658.46
April	161,780	29,910.78	1,182.83	31,093.61
May	162,326	27,979.92	1,188.34	29,168.26
June	<u>184,881</u>	<u>31,660.82</u>	<u>1,196.86</u>	<u>32,857.68</u>
	207,970,100	\$360,962.84	\$ 14,212.49	\$ 375,175.33

- Continued -

<u>1939</u>	<u>Consumption</u>	<u>Water Sales</u>	<u>Meter Rentals</u>	<u>Total Revenue</u>
July	217,115	\$ 34,318.70	\$ 1,208.78	\$ 35,527.48
August	202,241	32,745.11	1,214.66	33,959.77
September	213,171	34,927.56	1,219.82	36,147.38
October	185,392	31,107.63	1,210.37	32,318.00
November	179,701	30,856.28	1,207.60	32,063.88
December	175,778	30,260.33	1,207.28	31,467.61
<u>1940</u>				
January	179,121	31,405.64	1,200.73	32,606.37
February	175,194	29,689.24	1,193.60	30,882.84
March	159,195	28,422.31	1,197.52	29,619.83
April	168,150	30,155.79	1,212.38	31,368.17
May	216,629	34,766.27	1,224.03	35,990.30
June	<u>191,214</u>	<u>32,009.48</u>	<u>1,230.35</u>	<u>34,239.83</u>
	226,290,100	\$381,664.34	\$14,527.12	\$ 396,191.46
TOTAL	<u>434,260,200</u>	<u>1,270,251.90</u>	<u>49,753.46</u>	<u>1,320,005.36</u>

TOTAL REVENUE FROM WATER SALES &

METER RENTALS



COST OF MAILING AND DELIVERY OF BILLS

<u>MONTH</u>	<u>BILLS CARRIED</u>	<u>COST OF CARRYING</u>	<u>SAVING BY HAND DELIVERY</u>	<u>PIECES MAILED</u>	<u>COST OF MAILING</u>	<u>TOTAL MAILED & CARRIED</u>	<u>TOTAL COST OF MAILING & DELIVERY</u>
July	8,964	\$ 100.00	\$ 79.28	2,924	\$ 66.69	11,888	\$166.69
August	9,223	100.00	84.46	3,409	79.03	12,632	179.03
September	8,556	100.00	71.12	3,466	79.03	12,022	178.03
October	9,055	100.00	81.10	3,005	67.51	12,060	167.51
November	8,945	100.00	78.90	3,007	68.94	11,952	168.94
December	8,862	100.00	77.24	2,872	64.31	11,734	164.31
January	8,987	100.00	79.74	3,319	74.09	12,306	174.09
February	9,172	100.00	83.44	3,492	81.20	12,664	181.20
March	8,394	100.00	77.88	2,374	51.70	11,268	151.70
April	8,887	100.00	77.74	2,919	65.10	11,806	165.10
May	8,721	100.00	74.42	3,165	71.78	11,886	171.78
June	8,575	100.00	71.50	3,708	84.02	12,283	184.02
TOTAL	106,841	\$1,200.00	\$ 936.82	37,660	\$ 852.40	144,501	\$ 2,052.40

MAINTENANCE OF WATER LINES AND SEWER LINES

At the beginning of the fiscal year, the number of maintenance employees was reduced to the barest minimum consistent with keeping the distribution system in good operating condition. The reduced forces kept the pipe lines in good shape, without undue difficulty, for several months. On December 29th, however, one of the severest cold waves in the record of the weather bureau took place. Water lines and service connections throughout the city became frozen. The temperature remained below freezing, except for one or two very brief intervals, during the entire month of January.

As a result, the ground froze deeper every night. The freezing eventually reached a depth of about two feet and it became unusually difficult for the maintenance forces to dig up the ground and thaw the pipes. A heavy duty electric welding machine was

rented to assist in thawing the pipe lines. This motor-generator set forced high amperage through the pipe lines, thus generating heat enough to melt the frozen pipes. The equipment worked like magic in some cases but in many other places it failed altogether. Throughout the cold wave, both the main office and the shop office, were deluged with complaints that the customers were without water. Because literally hundreds of customers were clamoring simultaneously for service, the department was unable to reach them all quickly. Many customers were without water as long as two, and in some cases, three weeks.

Even though more than a hundred extra men were employed, it was not possible, under the conditions, to resume service promptly. In order to reach as many consumers as possible, the workmen were instructed to get the water to the consumers



Bridge washed away near house of Warden, Craig Burnett.

BEE TREE VALLEY



Looking southward from the top of the dam. Instrument house and sterilization plant shown in the center.

with the least possible work. Time was not taken to thoroughly repair the damage and lower the lines so that they would not become frozen again. Many of the pipe lines frozen in the early part of the cold wave became frozen a second time and these added to the burden of the rapidly increasing numbers of consumers without water. When the temperature finally rose enough to thaw the remaining pipes, hundreds of leaks developed throughout the system. The frozen and partially frozen pipes had bursted under-ground and leaks appeared almost everywhere.

Since the repairmen did not lower lines which became frozen, it is obvious that a similar cold wave will again bring about similar conditions. It is strongly recommended, therefore, that an appropriation be made to permit the water department to systematically lower all of the lines, service connections and meters which were found to be too shallow during the cold weather.

On the following pages is a list showing the streets where the pipe lines were frozen. All of these pipe lines, service connections and meters, should be lowered or replaced as soon as the funds are available.

Another tabulation on the following pages shows the principle items of operation during the fiscal year together with the cost of making repairs to the damaged lines. From the tabulation, it will be noted that the cost of maintenance increased tremendously during the months immediately following the freeze. It is estimated that the expenses occasioned by the cold wave were approximately \$10,000.00 above the normal maintenance cost. It is our opinion that the expenses of the maintenance division would have remained within the budget appropriation under normal conditions.

WATER LINES TO BE REPLACED OR LOWERED

SIZE	LOCATION	FROM	TO	LENGTH	NEW OR LOWER	CONNECTIONS LOWERED
2"	Atlanta Ave	Burton St	Northward	300	N	6
2"	Balsam Ave	Haywood Rd	Northward	300	N	12
3/4"	Bowling Park Rd	Caldonia Rd	Lowell St	200	L	1
3/4"	Branning St	Vandalia St	Millbrook Rd	200	L	5
1 1/4"	Culvern St	Beaverdam Rd	End	500	L	6
2"	Cameron St	College St	Hollywood St	300	N	3
2"	Carrier St	Sulpher Sp. Rd	Salola St	2500	N	10
2"	Center St	Brookshire St	London Rd	400	N	8
2"	Wyatt St	London Rd	Eastward	175	N	8
2"	West Chesnut All.	West Chesnut	Magnolia St	400	N	4
2"	West View Rd	Oak Park Rd	Town Mt. Rd	300	L	5
2"	West St	Hillside St	North St	500	N	10
3/4"	Dewitt St	Alline St	Tenie	200	L	7
2"	Daton St	Chatham Rd	Westward	650	N	8
3/4"	Durham St	Virginia	Hudson St	400	L	2
1"	Elm St	Merrimon	S. Liberty St	250	L	2
3/4"	Edgar St	Ohio St	Saratoga St	400	L	5
2"	Frederick St	Choctaw St	Northward	800	N	12
1 1/4"	Dover St	Beaverdam Rd	Westward	300	L	5
2"	Deaver St	Reynolds Rd	Brownwood Ave	2500	N	15
3/4"	Edgewood Rd	Merrimon Ave	Ivy St	600	L	12
1"	H'ville Rd	School	Southward	400	N	3
1 1/4"	Jason St	Hill St	Northward	300	L	8
3/4"	Ivey St	Lowell	Catham Rd	300	L	2
2"	Jersey St	Courtland Cr	Westward	400	L	15
3/4"	Lakewood Dr.	Falmouth	Westward	300	L	3
3/4"	Lilac St	Fairfax St	Meyers St	200	L	3
1 1/4"	Palmer St	Depot St	Graham St	600	L	16
1"	Clingman Ave	Clingman Ave	Westward	500	N	5

WATER LINES TO BE REPLACED OR LOANED

SIZE	LOCATION	FROM	TO	LENGTH	NEW OR		CONNECTIONS LOANED
					LOWER		
4"	Velvet St	Eagle St	Beaumont St	500	L		10
2"	Water St	Black St	Southward	400	L		14
3/4"	Short Woodrow St	Woodrow Ave	Northward	400	L		6
2"	Zillicoa St	Montford Ave	Cumberland Ave	1500	N		4
2"	Sassafras St	Hazard St	Northward	300	L		4
2"	Short Pine St	Pine St	Eastward	300	L		6
2"	Indiana Ave	Michigan Ave	Renover St	1200	N		12
3/4"	Westwood Pl.	Haywood Rd	Northward		N		6
2"	Black St	S. French 3rd Crant St		800	L		12
1"	Cliff Rd	Westwood Rd	Southward	400	N		3
2"	Lakewood Alley	Dudley Ave	Lakewood Pkway	600	L		3

WATER & SEWER LINES-MAINTENANCE RECORD

	1940												
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	Totals
Fire Hydrants Repaired	12	14	15	22	12	11	3	22	23	17	22	17	190
Stop Sewers	57	44	35	47	45	40	25	47	51	52	87	50	530
Leaks-Mains & Service Pipes	45	74	65	47	60	58	104	462	63	49	69	56	1,161
Leaks Supply Lines	2	0	2	1	2	1	1	1	1	2	3	1	17
North Fork	1	0	0	0	0	0	0	0	0	0	0	0	1
Sugar Fork Repairs	0	0	0	0	0	1	1	0	0	0	0	0	2

COST OF MAINTENANCE OF WATER & SEWER LINES

1939	1940												
July	Aug.	Sept	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	Totals	
Fire Hydrants Repaired	44.25	75.10	62.25	89.00	50.75	66.75		31.00	105.00	76.63	90.75	73.55	765.03
Stop Sewers	281.30	216.40	228.50	259.87	322.25	206.40	88.00	105.55	177.05	187.75	555.15	238.75	2,866.97
Leaks-Mains & Ser. Pipes	527.25	601.87	413.65	372.25	534.37	471.87	727.25	304.72	390.62	573.34	542.41	531.08	5,990.68
Leaks Supply Lines	11.20		7.23	5.50	14.75	5.25	3.75	3.75	5.25	8.75	30.25	11.50	107.18
North Fork	5.25												5.25
Sugar Fork Repairs						53.00	30.38						83.38

METER MAINTENANCE

The meter maintenance division of the department encountered nearly parallel conditions to those of the water and sewer maintenance division.

Hundreds of meters became frozen and broken during the cold wave. Many other meters were badly damaged by customers who built fires in the boxes with the hope that water service would be resumed. This division, too, probably would have completed the year within the budget appropriation if the cold wave had not caused such great damage.

The following pages show the number of meters repaired and the cost distribution of making the repairs. Each year many new meters are installed, but throughout the city there are many meters which are becoming old and unserviceable. Some of them have been in the ground fifteen or twenty years with-

out repairs. Like all mechanical things, they become worn and slow down with age. There is little doubt that many of the meters are registering less than the amount of water which passes through them, with consequent loss of revenue.

Under the present system, the department only has one meter repair man and helper. His entire time is consumed in the more or less urgent demands made by consumers who believe that their bills are too high. The repair man works long hours and spends much overtime trying to keep 13,396 meters in good working condition. Obviously, he does not have the opportunity to systematically remove, test, and repair all of the old meters suspected of registering too low. It is believed that the employment of an extra repairman for service maintenance each year would result in bringing in more than enough additional revenue to pay his wages.



Top of Bee Tree spillway during dry season.



Intake dam on left fork of North Fork.

METER MAINTENANCE RECORD

	1939			1940											
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	Total		
Meters Uncovered	110	118	84	100	79	54	73	66	132	106	86	112	1120		
" Re-Read	20	5	6	0	0	0	0	0	0	0	0	0	36		
" Repaired	62	75	58	52	81	54	30	116	210	158	121	93	1110		
" Raised	15	13	17	16	6	9	3	8	21	8	18	14	148		
" Lowered	33	55	41	77	72	46	21	16	50	38	29	38	516		
" Examined	138	158	147	152	180	141	242	472	252	268	201	175	2526		
" Leaking	54	71	58	74	77	59	107	296	113	74	78	57	1118		
" Tested	8	10	12	10	7	3	1	6	9	8	11	35	120		
" Replaced	11	11	7	8	9	6	2	35	27	10	4	3	133		
" Discontin'd	9	2	1	6	2	6	0	0	3	9	2	6	46		

COST OF PARTS AND LABOR FOR MOTOR VEHICLE

<u>1939</u>	<u>Gear</u>	<u>Not-</u> <u>tons</u>	<u>Dials</u>	<u>Gas-</u> <u>kets</u>	<u>Dial</u> <u>Glass</u>	<u>Dial</u> <u>Springs</u>	<u>Coup-</u> <u>lines</u>	<u>Bush-</u> <u>ings</u>	<u>Offs</u>	<u>Boxes</u>	<u>Rings</u>	<u>Lids</u>	<u>Discs</u>	<u>Washers</u>	<u>Labor</u>
July	40.50	.72	9.36	1.69	1.20	.....	.....	.36	.....	.....	7.50	2.00	19.44	.....	\$57.24
August	45.00	....	12.96	2.10	1.80	.....	.....	1.32	2.98	.....	10.50	7.00	27.00	.48	77.08
September	54.00	....	4.32	1.09	.60	.60	.....	.36	2.98	.....	.....	.....	27.00	1.24	69.22
October	54.00	....	8.64	1.47	1.50	.....	.....	.36	.....	1.40	6.00	4.00	19.44	.84	80.16
November	47.25	2.16	8.64	1.08	1.65	.40	.....	.....	.....	1.40	1.50	2.00	27.00	.72	76.06
December	67.50	....	4.32	2.10	1.20	.60	.....	.....	.....	.....	.....	.....	32.40	.96	70.50
<u>2040</u>															
January	27.00	4.32	4.32	.94	.....	.....	2.64	.....	.....	.....	.....	.....	12.96	.48	60.78
February	67.50	37.80	25.92	10.92	1.20	.....	19.36	.....	.....	4.20	3.00	2.00	6.48	3.44	234.76
March	139.50	6.48	61.20	5.46	2.40	.....	.....	.....	.....	14.80	7.50	7.00	71.28	.48	228.84
April	213.50	4.32	18.72	5.46	.....	.....	.....	.....	2.98	1.40	3.00	2.00	51.72	.36	162.42
May	103.50	....	4.32	4.20	2.50	.....	.....	.....	.....	5.80	8.00	.....	43.20	1.34	100.58
June	24.00	....	15.68	1.68	.....	.....	.....	.....	.....	2.80	3.00	.....	21.76	1.20	59.28
TOTAL	4942.25	55.80	178.41	39.48	24.03	1.00	22.00	2.40	8.94	30.80	48.00	26.00	363.68	11.54	1348.02

EXPENSE AND REVENUES FROM WATER AND SEWER SERVICE CONNECTIONS

REVENUE

EXPENSE

	<u>One Tap Water</u>	<u>One Tap Sewer</u>	<u>Two Taps S. & W.</u>	<u>Total Receipts</u>	<u>Labor</u>	<u>Material</u>	<u>Re- paving</u>	<u>Drayage</u>	<u>Total Expense</u>	<u>Net Revenue</u>
<u>1932</u>										
July	\$152.50	\$ 15.00	\$ 105.00	\$ 272.50	\$ 78.00	\$ 79.25	\$ 15.00	\$ 14.00	\$ 186.25	\$ 86.25
August	154.06	80.00	155.00	389.06	67.37	74.58	7.50	15.00	164.45	224.61
September	200.00	40.00	.....	240.00	53.25	63.25	8.50	11.00	136.00	104.00
October	112.50	15.00	110.00	237.50	32.82	36.49	.....	9.00	78.31	159.19
November	112.50	90.00	167.50	370.00	61.75	35.53	22.50	9.00	128.78	241.22
December	12.50	25.00	70.00	107.50	15.75	12.16	.....	3.00	30.91	76.59
<u>1940</u>										
January	15.00	30.00	170.00	215.00	56.25	36.43	21.00	7.00	120.68	194.32
February	15.00	.....	202.50	217.50	57.45	68.86	3.00	6.00	135.31	82.19
March	237.50	15.00	190.00	442.50	100.80	144.55	20.50	16.00	281.85	160.65
April	112.50	15.00	70.00	197.50	45.60	31.79	20.00	9.00	106.39	91.11
May	125.00	15.00	90.00	230.00	49.60	50.46	3.00	11.00	114.06	115.94
June	139.00	95.00	160.00	394.00	87.77	51.87	21.00	14.00	174.64	219.36
TOTALS	\$ 1,388.06	\$ 435.00	\$1,490.00	\$3,313.06	\$ 706.41	\$ 685.22	\$142.00	\$ 124.00	\$1,657.63	\$ 1,755.43

NEW WATER AND SEWER CONNECTIONS INSTALLED JULY 1,39 JUNE 30,40

NAME	ADDRESS	WATER	SEWER
Parker & Glenn	Otis St.	5/8	
L. H. Pollock	Brick St.	5/8	
L. H. Pollock	Brick St.	5/8	
J. S. Sumner	46 Pine Grove Ave.	5/8	
J. S. Sumner	46 Pine Grove Ave.	5/8	
A. H. Garrett	133 Barnard Ave.	5/8	
Dan Fair	17 Clairmont Ave.	5/8	
Mrs. J. E. Bostic	Sweeten Creek Rd.		4"
T. P. Yarrow	60 Richmond Ave.	5/8	4"
W. M. Martin	55 Sheridin Rd.	5/8	4"
Harrison Auto Parts Co.	Craven St.	5/8	
E. F. Magruder	30 Swannanoa Ave.	5/8	4"
V. G. Moser	Valley St.		4"
C. C. Miller	S. Madison Ave.		6"
John W. Gillian	242 Ashland Ave.	5/8	4"
J. T. Bostic	78 Mt. Vernon Pl.	5/8	
Dr. H. M. May	62 Salola St.	5/8	4"
Thad Sherlin	State St.	5/8	4"
V. G. Moser	College St.	5/8	4"
V. G. Moser	College St.	5/8	
V. G. Moser	College St.	5/8	
Mrs. C. Manley	255 S. Liberty St.	5/8	
Mrs. C. Manley	255 S. Liberty St.	5/8	
Prudential Ins. Co.	87 1/2 Brevard Rd.		4"
V. G. Moser	86 Vance Crescent		4"
John Lawrence	223 Waynesville Ave.		4"
Marvin T. Sublett	Bear Creek Rd.	5/8	4"
Elmer Ingle Co.	495 Hendersonville Rd.	5/8	
T. P. Yarrow	1 Yarrow Lane	5/8	4"
Mrs. D. K. Lipe	Warren Ave.		4"
W. S. Harrison	Haywood Rd.	3/4	6"
Geo. Whitaker	Pine Tree Cir.	5/8	4"
J. H. Matheson	361 Reed St.	5/8	4"
C. E. Reeves	Kenilworth Rd.	5/8	4"
Wallace Winters	Thompson Rd.	5/8	
Biltmore Estate	Meadow Rd.	5/8	
Mrs. Florence Jewett	530 Sherwood Rd.	5/8	4"
J. H. Glover	43 Hamilton St.	5/8	4"
T. J. Adams	Woodward Ave.	5/8	4"
T. J. Adams	Woodward Ave.	5/8	4"
Clarence Gladstone	Old Haw Creek Rd.	5/8	
P. K. Wilde	27 Vance St.	5/8	
Dilliard Realty Co.	170 1/2 Broadway	5/8	
W. J. Hendon	N. Griffin Blvd.	5/8	4"

- Continued -

NAME	ADDRESS	WATER	SEWER
H. W. Kindler	88 Carrier St.		4"
Mrs. Mary Parr	52 Cumberland Ave.	5/8	
L. B. Jackson	Flint St.	5/8	4"
H. W. Kindler	Pine Tree Rd.	1"	4"
E. F. Wilson	53 Poplar St.	5/8	
W. H. Westall	Central Ave.	5/8	
Hattie Tatum	39 1/2 Biltmore Ave.	5/8	
W. E. Shuford	52 Mt. Clair Ave.	5/8	
W. E. Shuford	Louis Hill	5/8	
W. E. Shuford	60 Brick St.	5/8	
Randolph School	Montford Ave.	2"	
Wesley W. Brown	Herrimon Ave.	5/8	4"
W. E. Shuford	137 Hill St.	5/8	
Ray Chandley	Reed St.		6"
H. W. Kindler	Haywood St.	3"	
H. W. Kindler	Biltmore Ave.	5/8	
H. W. Kindler	Biltmore Ave.	5/8	
C. M. Haytt	College St.		4"
H. C. Nicholson	Ivey St.	5/8	
D. B. Whitesides	N. Lexington Ave.	5/8	4"
L. H. Pollock	Brick St.	5/8	6"
Guy H. White	95 Blue Ridge Ave.	5/8	4"
V. G. Moser	W. Euclid Ave.		4"
C. A. Dewey	535 McDowell St.	1"	
Ray Chandley	Reed St.	5/8	
J. A. Brinkley	Laurel Ave.	5/8	
Greene & Goodman	Eagle St.	5/8	
Greene & Goodman	Eagle St.	5/8	
A. L. Mallory	Forest Hill Inn	1 1/2"	
H. D. Kinard	808 Reed St.	5/8	
J. A. Brinkley	Laurel Ave.		4"
Moser Plumbing Co.	125 Poplar St.	5/8	
McCrary & Cauble	Ashland Ave.	5/8	
McCrary & Cauble	Ashland Ave.	5/8	
W. E. Shuford	154 S. Beaumont St.	5/8	
John B. Hutchings	35 King St.	5/8	4"
C. C. Willis	S. Madison Ave.	5/8	
C. C. Willis	S. Madison Ave.	5/8	
C. W. Teague	Chiles Ave.	5/8	4"
R. P. Booth & Co.	N. Griffin Blvd.	5/8	4"
W. E. Shuford	103 Burton Ave.	5/8	
E. F. Kilpatrick	Maywood Ave.	5/8	4"
H. W. Kindler	Haywood Rd.	5/8	4"
Kindler Plumbing Co.	267 Pearson Dr.	5/8	
V. A. Murdock	105 Carrier St.	5/8	4"

- Continued -

NAME	ADDRESS	WATER	SEWER
John Bowman	77 Sarasota	5/8	
W. S. Harrison	687 Haywood Rd.	5/8	4"
Wachovia Bank	Patton Ave.	6"	
Larmier Williams	King St.		4"
T. A. Groce Jr.	29 Lucerne Ave.	5/8	4"
McRary & Cauble	Patton Ave.	1 1/2"	
V. G. Moser	41 Lincoln Ave.		4"
W. E. Shuford	34 Courtland Ave.	5/8	4"
L. W. Williams	Oakland Rd.	5/8	
J. R. Lovelace	Haywood Rd.	5/8	
Geo. Whitaker	118 Lakeshore Dr.	5/8	
C. B. Joyner	Haywood Rd.	5/8	4"
Tench Parks	37 Grail St.	5/8	
Community Laundry	Carolina Lane		6"
Zeb Robinson	Cose St.	5/8	
W. D. Corn	Dallas St.	5/8	4"
W. E. Duckett	Bee Tree Rd.	5/8	
Broome Cafeteria	Patton Ave.	1"	
L. H. Pollock	Brick St.	5/8	
L. H. Pollock	Brick St.	5/8	
H. W. Kindler	Merrimon Ave.	5/8	
L. M. Riddle	Lakewood Rd.	5/8	
E. J. Tyler	410 Kimberly Ave.	5/8	4"
L. B. Jackson	487 Kimberly Ave.	5/8	4"
Arnold Miller	Clarden Rd.	5/8	
F. F. Neighbors	4 Valley St.		4"
A. C. Williams	Biltmore Ave.	4"	
M. B. Blomberg	Poplar St.		4"
A. J. Garner III	N. Griffin Blvd.	5/8	
Sluder Bros.	Dorchester Ave.		4"
Morris Austin	Wendover Rd.	5/8	4"
Morris Austin	Wendover Rd.	5/8	4"
Mrs. D. K. Lipe	Warren Ave.	5/8	
Geo. Pennell	N. Kensington Dr.	5/8	4"
Biddy	361 Riverview Dr.		4"
Trueheart Kennedy	102 Livingston St.	5/8	
S. C. Waddell	9 Vernell Ave.		4"
J. H. Chrisp	80 Middlemont Ave.	5/8	4"
F. T. Reeder	6 Bear Creek Rd.	5/8	4"

SUMMARY

Water Connections

5/8"	98
3/4"	1
1"	3
1-1/2"	2
2"	1
3"	1
4"	1
6"	1

Sewer Connections

4"	57
6"	5

METERS AND DISTRIBUTION SYSTEM

During the fiscal year, 113 new meters were added to the city lines and 185 new meters added to the county lines. A total of 298 new consumers were added to the system during the year.

As shown on the tabulation on the following page, there are now 11,642 meters in service on the city lines and 1,754 in service in the county. These meters, together with 850 meters belonging to private companies, make a total of 14,246 meters supplied by the city system.

METERS SUPPLIED BY CITY WATER SYSTEM

<u>SIZE</u>	<u>NEW METERS CITY LINES</u>	<u>NEW METERS COUNTY LINES</u>	<u>TOTAL METERS CITY LINES</u>	<u>TOTAL METERS COUNTY LINES</u>
5/8"	99	182	11,234	1,680
3/4"	3	0	51	3
1"	2	3	130	30
1-1/2"	3	0	77	12
2"	3	0	78	16
3"	1	0	20	0
4"	2	0	31	3
6"	0	0	17	7
8"	0	0	4	0
10"	0	0	0	1
12"	0	0	0	2
TOTALS	113	185	11,642	1,754

S U M M A R Y

Meters on City Lines	11,642	
Meters on County Lines	1,754	
Total Meters of City and County	13,396	13,396
Meters of Private Water Companies supplied by City:		
Acton Water Company	100	
East Biltmore Company	750	
Total of Private Companies	850	850
TOTAL SUPPLIED BY CITY,		14,246

FREE FIRE PROTECTION

There are many industrial establishments and buildings in the city and county which have sprinkler heads, private fire hydrants and hose connections for fire protective purposes. These outlets are not metered, consequently no payment is made when water is used and no meter rental is obtainable. This city receives no recompense for the fire protection thus afforded, although most other cities make a charge for the service.

A sizable revenue, estimated to be about \$8,191.60 might be obtained from this source. A table on the following pages will show the number of sprinkler heads in the establishments and an estimate of the possible revenue which might be derived from the service.

Practically all of the firms are large

well-established companies who would probably recognize the underlying justice of making such a charge. Although they might offer some protest at first, it is believed that they would accept the charges without undue complaint especially if it is pointed out that practically all other cities charge for maintaining water pressure on fire protective devices.

Some of the industrial companies which are benefited most by the free fire protection pay no city taxes. The American Enka Corporation, for example, has 31 hydrants for which no rental is paid; The Oteen Hospital, which gets water at eight cents per thousand gallons, has 71 fire hydrants from which we receive no revenue.

QUALITY OF ASHEVILLE WATER

There has been considerable discussion regarding the quality of the Asheville water. There have been many complaints from some parts of the city that

the taste, the odor and the turbidity of the water have been noticeable. These complaints were received from some of the northern sections of the city and from the tenants in the high uptown buildings. Apparently free chlorine passes through the unareated Beaucatcher reservoir and collects in dead-end pipes and in the upper stories of high buildings.

The presence of chlorine naturally gives rise to complaints. The color in the water is due to suspended matter which comes from the water sheds without filtration. The construction of the Blue Ridge Parkway around the upper rim of both water sheds has left a huge raw scar in the mountainside. Hard rains bring down red clay which discolors the water and becomes deposited in thin layers at the bottom of the distribution pipe lines. Whenever the water is stirred up by opening hydrants for street flushing, consumers almost invariably call the office

about the muddy water. Of course, all of the settlement is not mud. Much of it is broken leaf particles and other extraneous matter which is not screened out at the intakes.

The unpalatable taste may be improved considerably by installing aeration nozzles at the Beaucatcher reservoir, but the removal of suspended matter will be much more difficult to accomplish. The installation of settling basins, or a filtration plant, will be required if we are to have water completely free from color and dirt. Aside from the excessive chlorine in some parts of the system and occasional turbidity of the water, the supply is one of exceptional purity, both bacteriologically and chemically.

The bacterial analysis listed on the following pages show that the raw water samples obtained from the North Fork and Bee Tree streams are relatively free from bacteria most of the year. The bacteria count does

rise somewhat during the summer months, however, so that chlorination and ammoniation are a necessary precaution. The state health department recommends heavier dosage of chlorine and ammonia than is entirely necessary for our supply.

The analyses of the samples in the city show that the water, after it has been treated, is positively safe for any consumption the year around. The analyses show, too, a most unusual freedom from mineral salts which causes hardness of the water. The water is so soft and so devoid of mineral salts that the water-works officials from other cities are amazed when they see the results of the analysis.

The water is so pure chemically that it may be used directly in automobile batteries without distillation. There are very few cities in the country which have water that may be used in batteries even after extensive treatment of the water has been made.



Foot bridge leading to intake tower at Bee Tree Dam. Evaporation pan and guage shown in left foreground.



Cars, trucks and equipment of contractors building Blue Ridge Parkway shown parked on the Bee Tree water shed.

SPRINKLERED BUILDINGS - CITY

<u>LOCATION</u>	<u>OCCUPANT</u>	<u>NO. SPRINKLER HEADS</u>
Biltmore, N.C.	Mike Arakes	450
Coxe Street	Abbott-Knight, Inc.	163
178 Clingman Ave.	Asheville Mattress Factory	130
Kimberly Ave.	Asheville Country Club	100
12 Rankin Ave.	Asheville Laundry	250 App.
Cor. Church & Aston	Aston Apartments	600
Southside Ave.	Chero-Cola Bottling Co.	390
Biltmore, N.C.	City Offices	175
Broadway	Community Laundry	364
333 Cumberland Ave.	Francis Apartments (B. H. Holder)	148
Riverside Drive	Hans Reese Tannery	4668
Ashland Ave.	M. & M. Radiator Co.	160
Coxe Street	Mountain City Laundry	617
Patton Ave.	Montgomery-Ward Co.	514
Gov't St. & Battery	Office Building	300
Park Place	S. B. Pennick & Co.	376
Broadway & Catawba St.	Pepsi Cola Bottling Co.	150
Woodfin Street	Smith's Drug Store	300
14-16 So. Lexington	Swannanoa Laundry	600 App.
Church Street	Weaver Estate	300
Hilliard Street	Wachovia Bank	567
Patton Ave.		
TOTAL		11,322

SPRINKLERED BUILDINGS - COUNTY

Azalea, N.C.	Azalea Woodworking Co.	900
Enka, N.C.	American Enka Corporation	13,164
Sulphur Springs	Asheville School for Boys	1,800
Swannanoa, N.C.	Beacon Manufacturing Co.	5,633
Swannanoa, N.C.	Dimension Manufacturing Co.	594
Deaverview Road	Knitting Mills (Deaverview)	113
Black Mountain Highway	Sayles-Biltmore Bleacheries	2,447
TOTAL		24,651

PRIVATE FIRE HYDRANTS & HOSE CONNECTIONS - CITY

<u>LOCATION</u>	<u>OCCUPANT</u>	<u>PRIVATE FIRE</u>		<u>HOSE CONNECTIONS</u>				
		<u>HYDRANTS</u>		<u>1"</u>	<u>1 1/2"</u>	<u>1 3/4"</u>	<u>2"</u>	<u>2 1/2"</u>
Page Avenue	Arcade Building							36
Kimberly Avenue	Asheville Country Club				5			
Woodfin & Market Sts.	Asheville-Biltmore Hotel			8				2
Eagle & Market Sts.	Asheville Supply & Foundry Co.					4	6	
So. French Broad Ave.	Aston Park Hospital					13		
Rankin Ave. & Walnut Sts.	Bell Telephone Co.							
Page Avenue	Battery Park Hotel			3				
Biltmore, N.C.	Biltmore Hospital				5			34
Chestnut Street	Commodore Apartments						2	
College Street	County Court House							
Biltmore Avenue	Coca-Cola Company							
Haywood St. & N.Pr. Broad	Carolina Apartments	2			9			
Kimberly Avenue	Corburn Apartments							
Sunset Drive	Edgewood Cottage				2			10
Battery Park Avenue	Flat Iron Building							
Depot Street	Freight Depot						2	
Hendersonville Road	Gallagher Lumber Co.	4						
Charlotte Street	Grove Park Hotel							2
Riverside Drive	Hans Reese Tannery	17						7
Haywood Street	Hotel Asheville						3	
Haywood Street	Ivey's Inc.						23	
Park Square	Jackson Building						14	
Woodfin Street	Mission Hospital					10		
Charlotte Street	Manor Hotel			17				
Biltmore Avenue	Milner Hotel				5			7
Market & Walnut Sts.	New Medical Building							
Haywood Street	J.C. Penny & Co. Inc.				7			
Patton Avenue	Public Service Building						9	
Otis Street	Post Office					16		

PRIVATE FIRE HYDRANTS & HOSE CONNECTIONS - CITY

<u>LOCATION</u>	<u>OCCUPANT</u>	<u>PRIVATE FIRE HYDRANTS</u>	<u>HOSE CONNECTIONS</u>		
			1"	1 1/2"	2"
Sunset Drive	Roy Cottage	1			
Biltmore Avenue	St. Joseph's Sanitorium	1		2	
Victoria Road	St. Genevieve's				1
Riverside Drive	Texas Oil Co.				16
Haywood Street	Vanderbilt Hotel			4	
Broadway	Y.M.C.A.				

PRIVATE FIRE HYDRANTS & HOSE CONNECTIONS - COUNTY

<u>LOCATION</u>	<u>OCCUPANT</u>	<u>PRIVATE FIRE HYDRANTS</u>	<u>HOSE CONNECTIONS</u>		
			1"	1 1/2"	2"
Azalea, N.C.	Azalea Woodworking Co.	6			
Enka, N.C.	American Enka Corporation	31			
Sulphur Springs	Asheville School for Boys	6			3
Swannanoa, N.C.	Dimension Manufacturing Co.	5			
Black Mountain Highway	Sayles-Biltmore Bleacheries	8		9	
Ambler Heights	Ambler Heights Sanitorium				42
Oteen, N.C.	Oteen Hospital	71			

S U M M A R Y

35,972	Sprinkler heads at	\$ 0.05	\$1,798.60
151	Private hydrants at	25.00	3,775.00
145	Hose connections, 1" to 1 1/2" at	6.00	870.00
96	Hose connections, 2" at	8.00	768.00
98	Hose connections 2 1/2" at	10.00	980.00
TOTAL			\$ 8,191.60

ANALYSIS OF CITY OF ASHEVILLE WATER
NOVEMBER 30, 1939

PHYSICAL CHARACTERISTICS

Color: (apparent as received)
 (after filtration thru
 paper) 7.0

5.0

Odor: None

Parts per Million	Grains per Gallon
----------------------	----------------------

Suspended Matter: 1.0 0.06

Turbidity: 1.0

CHEMICAL CHARACTERISTICS

Total Hardness as CaCO ₃	6.0	0.36
Alkalinity (M)	9.0	0.54
Alkalinity (F)	0.0	0.0
Total Dissolved Solids	23	1.4
Iron as Fe (Tr. less than)	0.1	0.05
Oxygen Consumed	0.8	
pH (ratio 6.6)		
Fluorine (F)	0.2	0.01

HYPOTHETICAL COMBINATIONS

	Parts per Million	Grains per Gallon
Calcium Carbonate	4.0	0.24
Calcium Sulfate	0.0	0.0
Calcium Chloride	0.0	0.0
Magnesium Carbonate	2.0	0.12
Magnesium Sulfate	0.0	0.0
Magnesium Chloride	0.0	0.0
Sodium Sulfate	0.0	0.0
Sodium Chloride	4.0	0.24
Sodium Carbonate	3.0	0.18
Iron Oxide (unfiltered sample)	n.d.	
(sample filtered thru paper)	*Tr.	
Silica	10	0.6
Free Carbon Dioxide	3.0	0.18
*Trace less than	0.1	

Reg. U.S. lbs. Hyd. Lime/1000 Gals.
 (includes excess of $\frac{1}{2}$ gr. Lime)

ANALYSIS OF CITY OF ASHTABULA WATER

PHYSICAL DATA TABLE MADE

	Parts per Million
Suspended Matter.....	1.0
Turbidity.....	1.0
Color (apparent as received).....	8.0
Color (filtered thru paper).....	7.0
Odor.....	None

CHEMICAL

Calcium (Ca).....	1.0
Magnesium (Mg).....	0.5
Sodium (Na).....	3.0
Alkalinity (as CO ₂).....	4.0
Sulfate (SO ₄).....	3.0
Chloride (Cl).....	1.0
Nitrate (NO ₃).....	n.d.
Iron (Fe).....	*Tr.
Manganese (Mn).....	n.d.
Silica (SiO ₂).....	9.0
Fluorine (F).....	0.1
Free Carbon Dioxide.....	3.0
Hydrogen Sulfide.....	n.d.
Mineral Acidity (as CaCO ₃).....	0.0
Oxygen Consumed.....	2.3
pH.....	6.7 (ratio)
*Tr. less than.....	0.1

Analysis made 11/28/39

ANALYTICAL CONCENTRATION

	Parts per Million	Grains per Gallon
Calcium Carbonate.....	3.0	
Calcium Sulfate.....	0.0	
Calcium Chloride.....	0.0	
Magnesium Carbonate.....	2.0	
Magnesium Sulfate.....	0.0	
Magnesium Chloride.....	0.0	
Sodium Carbonate.....	2.0	
Sodium Sulfate.....	4.0	
Sodium Chloride.....	1.0	
Iron Oxide (unfiltered).....	*Tr.	
Iron Oxide (filtered thru paper).....	n.d.	
Silica.....	9.0	1.3
Total Dissolved Solids.....	21	
*Trace less than.....	0.1	
Alkalinity (P) as CaCO ₃	0.0	0.0
Alkalinity (N) ".....	7.0	0.42
Total Hardness ".....	5.0	0.30
Calcium Hardness ".....	3.0	0.18
Magnesium Hardness ".....	2.0	0.12
Non-Carbonate Solids ".....	4.0	0.24
Total Solids ".....	11	0.7
Mineral Acidity ".....	0.0	0.0
Total Sodium Salts.....	7.0	0.42

ASHEVILLE CITY WATER

AT ENKA, N. C.

10/24/39

Turbidity	0.7
Dissolved solids	25.50 ppm
Loss on Ignition	6.10 ppm
Iron Fe	0.027 ppm
Potassium Permanganate, KMnO_4	3.16 ppm
Silicon Dioxide, SiO_2	8.25 ppm
Alumium Al	0.10 ppm
Calcium Ca	1.30 ppm
Magnesium Mg	0.59 ppm
Sulfate, SO_4	2.30 ppm
Calcium Hardness	5.67 ppm

BACTERIAL ANALYSIS OF CITY WATER

SOURCE	DATE TAKEN	DATE PLATED	B. C. O. L. I. (10 C.C. 1 C.C. CONFIRMATION)		TOTAL COUNT 37 DEGREES C 1.C.C.	COUNT ON L.L.AGAR	ACID PRODUCERS PER C.C.
City Hall	July 1, 1939	July 1, 1939	-	-	9	0	0
"	1	1	-	-	5	0	0
"	12	12	-	-	7	0	0
"	13	13	-	-	4	0	0
"	14	14	-	-	2	0	0
"	15	15	-	-	2	1	0
"	16	16	-	-	8	3	0
"	17	17	-	-	5	1	0
"	18	18	-	-	2	4	0
"	19	19	-	-	5	1	0
"	20	20	-	-	0	80	0
"	22	22	1+	+	12	0	0
"	25	25	-	-	2	2	0
"	26	26	-	-	3	0	0
"	27	27	-	-	0	0	0
"	28	28	-	-	1	0	0
"	29	29	-	-	0	0	0
"	31	Aug. 1	-	-	Spreader	0	0
"	Aug. 1	1	-	-	0	0	0
"	2	2	-	-	0	0	0
"	3	3	-	-	0	0	0
"	4	4	-	-	0	0	0
"	5	5	-	-	3	200	0
"	7	7	-	-	5	1	0
"	9	9	-	-	2	6	0
"	11	11	-	-	4	22	0

BACTERIAL ANALYSIS OF CITY WATER

SOURCE	DATE TAKEN	DATE PLATED	B. COLI (10 C.C. 1 C.C. CO. FIRMATION)		TOTAL COUNT 37 DEGR. ES C 1 C.C.	COUNT ON L. L. AGAR	ACID PRODUCERS PER C.C.
City Hall	Aug. 12, 1939	Aug. 12, 1939	-	-	0	50	0
"	15	15	-	-	1	5	0
"	17	17	-	-	7	2	0
"	18	18	-	-	13	2	0
"	21	21	-	-	1	0	0
"	22	22	-	-	2	0	0
"	21	21	-	-	1	30	0
"	23	23	-	-	2	0	0
"	26	26	-	-	8	100	0
"	Sept. 5	Sept. 5	-	-	2	1	0
"	12	12	-	-	5	6	0
"	18	19	-	-	5	3	0
"	19	19	-	-	2	1	0
"	24	24	-	-	4	1	0
"	28	28	-	-	5	3	0
"	Oct. 3	Oct. 3	-	-	2	12	0
"	7	7	-	-	8	-	0
"	9	10	1+	1+	400	*	0
"	10	10	-	-	0	0	0
"	11	12	-	-	15	0	0
"	12	12	-	-	49	0	0
"					(little spreader)		
"	16	16	-	-	10+	34	0
"	20	20	-	-	7	0	0
"	23	23	2+	2+	3	13	0
"	25	25	-	-	12	4	0

* Too many to count

BACTERIAL ANALYSIS OF CITY WATER

[illegible]

BACTERIAL ANALYSIS OF CITY WATER

SOURCE	DATE TAKEN	DATE PLATED	B. C. C. I (10 C.C. 1 C.C. CONFIRMATION)	TOTAL COUNT		COUNT ON L.L. AGAR	ACID PRODUCERS PER C.C.
				37 TEMES	CL. C.C.		
City Hall	Dec. 13, 1939	Dec. 13, 1939	-	1	1	1	0
"	Jan. 2, 40	Jan. 2, 40	-	2	7	7	0
"	3, 4	4	-	0	0	0	0
"	4, 8	4	-	0	0	0	0
"	8	8	-	2	2	2	0
"	9	10	-	2	0	0	0
"	10	10	-	0	0	0	0
"	11	12	-	0	0	0	0
"	12	12	-	0	0	0	0
"	15	15	-	0	0	0	0
"	16	17	-	0	0	0	0
"	17	17	-	2	1	1	0
"	18	18	-	0	0	0	0
"	19	19	-	0	0	0	0
"	20	20	-	0	0	0	0
"	22	22	-	0	0	0	0
"	23	25	-	1	3	3	0
"	24	24	-	1	1	1	0
"	25	25	-	1	0	0	0
"	26	26	-	0	0	0	0
"	27	27	-	0	0	0	0
"	29	29	-	0	0	0	0
"	30	30	-	0	0	0	0
"	31	31	-	1	0	0	0
"	Feb. 1, 1940	Feb. 1, 1940	-	1	0	0	0
"	2	2	-	1	0	0	0
"	3	3	-	0	0	0	0

BACTERIAL ANALYSIS OF CITY WATER

SOURCE	DATE TAKEN	DATE PLATED	(10 C.C. 1 C.C. CO. PLATATION)		TOTAL COUNT 37 DEGR. S C 1.C.C.	COUNT ON L.L.M. AR	ACID PRODUCERS PER C.C.
City Hall	Feb. 5, 1940	Feb. 5, 1940	-	-	0	3	0
"	6	6	-	-	1	0	
"	7	7	-	-	1	0	
"	8	8	-	-	1	0	
"	9	9	-	-	0	2	
"	12	12	-	-	0	0	
"	13	14	-	-	1	0	
"	14	14	-	-	0	0	
"	15	15	-	-	0	21	0
"	20	21	-	-	0	0	
"	21	21	-	-	0	0	
"	22	22	-	-	0	0	
"	23	23	-	-	0	2	0
"	24	24	-	-	0	0	
"	28	29	-	-	0	0	
"	29	29	-	-	0	0	
"	Mar. 1, 1940	Mar. 1, 1940	-	-	0	0	
"	2	4	-	-	0	1	0
"	3	4	-	-	0	0	
"	4	4	-	-	1	0	
"	6	6	-	-	0	0	
"	7	7	-	-	0	2	0
"	8	8	-	-	1	1	0
"	10	11	-	-	0	0	
"	11	11	-	-	0	0	
"	13	13	-	-	4	3	
"	14	14	-	-	12	0	
"	15	15	-	-	0	0	

BACTERIAL ANALYSIS OF CITY WATER

SOURCE	DATE TAKEN	DATE PLATED	B. C. C. L. I.		TOTAL COUNT 37 DEGREES C I.C.C.	COUNT ON L.L.AGAR	ACID PRODUCERS PER C.C.
			(10 C.C.)	(1 C.C. CONFIRMATION)			
City Hall	Mar. 16, 1940	Mar. 16, 1940	-	-	1	4	3
"	18	19	-	-	0	1	0
"	19	19	-	-	0	0	
"	20	20	-	-	2	0	
"	21	21	-	-	0	0	
"	22	22	-	-	1	0	
"	23	23	-	-	2	0	
"	24	26	-	-	0	1	0
"	25	26	-	-	1	0	
"	26	26	-	-	2	0	
"	27	28	-	-	1	1	0
"	28	28	-	-	1	1	0
"	29	29	-	-	2	18	0
"	30	Apr. 1, 1940	-	-	2	0	0
"	1	1	-	-	0	1	0
"	2	2	-	-	0	1	0
"	2	2	-	-	0	1	0
"	4	4	-	-	0	1	0
"	5	5	-	-	2	0	
"	8	8	-	-	0	0	
"	9	9	-	-	2	0	
"	10	10	-	-	1	1	0
"	12	12	-	-	0	0	
"	15	15	-	-	0	1	0
"	16	16	-	-	0	1	0
"	17	17	-	-	0	0	
"	18	18	-	-	2	1	0
"			-	-	2	2	

BACTERIAL ANALYSIS OF CITY WATER

<u>SOURCE</u>	<u>DATE TAKEN</u>	<u>DATE PLATED</u>	<u>B. C. C. I</u> (10 C. C. 1 C. C. CONFIRMATION)	<u>TOTAL COUNT</u> 27 DEGREES C L. C. C.	<u>COUNT ON</u> L. L. AGAR	<u>ACID PRODUCERS</u> PER C. C.
City Hall	Apr. 20 -40	Apr. 22, 40	- -	1	0	0
"	21	22	- -	2	0	
"	22	22	- -	0	0	
"	23	23	- -	1	1	0
"	24	25	- -	0	0	
"	25	25	- -	1	1	0
"	26	26	- -	0	1	0
"	29	30	- -	0	0	
"	29	30	- -	0	0	
May	1 40	1	-	0	2	0
"	2	4	-	1	3	0
"	3	4	-	1	0	
"	4	4	-	0	2	0
"	6	7	-	0	0	
"	7	7	-	0	1	0
"	8	9	-	0	1	0
"	9	9	-	1	0	
"	12	13	-	2	0	
"	13	13	-	1	0	
"	14	15	-	0	0	
"	17	17	-	0	0	
"	17	17	- -	2	0	
"	18	20	-	0	0	
"	19	20	-	0	0	
"	20	20	-	0	0	
"	22	22	-	0	2	0

BACTERIAL ANALYSIS OF CITY WATER

SOURCE	DATE TAKEN	DATE PLATED	(10 C.C. 1 C.C. CONFIRMATION)	B. C O L I	TOTAL COUNT 37 DAPIRES C 1.C.C.	COUNT ON L.L. AGAR	ACID PRODUCERS PER C.C.
City Hall	May 23, 1940	May 23, 1940	-		0	0	
"	24	24	-		3	0	
"	26	27	-	-	1	0	
"	27	27	-	-	0	0	
"	29	29	-				
"	30	30	-				
"	31	31	-				
"	June 1, 1940	June 1, 1940	-		7	4	
"	2	2	-		4	2	
"	3	7	-		4	0	
"	4	4	-		1	0	
"	5	6	-		0	0	
"	6	6	-		0	0	
"	8	8	-		0	0	
"	9	10	-		0	0	
"	10	10	-		3	0	
"	11	11	-		0	1	0
"	12	13	-	-	3	3	0
"	13	13	-	-	13	2	0
"	14	14	-		3	2	0
"	15	15	-		3	2	0
"	17	17	-		2	0	0
"	18	19	+	NC	11	2	0
"	19	19	-		6	3	0
"	20	20	-		1	1	0
"	22	22	-		2	0	0

BACTERIAL ANALYSIS OF CITY WATER

<u>SOURCE</u>	<u>DATE TAKEN</u>	<u>DATE PLATED</u>	<u>B. COLI</u> (10 C.C. 1 C.C. CO FIRMATION)	TOTAL COUNT 37 DEGREES C. 1 C. C.	COUNT ON L L AGAR	ACID PRODUCED P R C. C.
City Hall	June 23, 1940	June 24, 40		1	0	
"	25	25	-	0	2	0
"	26	26	-	0	0	
"	27	27	-	35	60	0
"	28	28	-	12	0	

BACTERIAL ANALYSIS OF CITY WATER

SITE	DATE TAKEN	DATE PLATED	(10 C.C.)	B. C. COLI	C. I. C. C.	37 DEGREES	TOTAL COUNT		COUNT ON ACID PRODUCERS
							C. I. C. C.	I. L. ACAR	PER C. C.
Left Fork at Trail Crossing	Jul. 18, 39	Jul. 18, 39	5 +	-	-	95	250	0	0
Main Creek at mouth	18	18	4 +	+	+	672	1125	1	1
Right Fork at mouth	18	18	4 +	+	+	500	214	0	0
Left Fork "	25	25	2 +	+	+	40	50	0	0
Main Creek "	25	25	3 +	+	+	20	35	0	0
Right Fork "	25	25	3 +	+	+	25	22	0	0
Left Fork "	Aug. 1, 39	Aug. 1, 39	3 +	+	+	90	0	0	0
Main Creek "	1	1	3 +	+	+	120	60	0	0
Right Fork "	1	1	2 +	+	+	10	0	0	0
Left Fork "	7	8	1 +	+	+	1424	1296	0	0
Main Creek "	7	8	2 +	+	+	800	420	0	0
Right Fork "	7	8	3 +	+	+	1280	2048	0	0
Left Fork "	14	15	-	-	-	50	36	0	0
Main Creek "	14	15	-	-	-	41	(37)	0	0
Right Fork "	14	15	-	-	-	16	(Spreader)	0	0
Left Fork at mouth	28	28	-	+	+	(85)	26	0	0
Main Creek at mouth	28	28	-	-	-	(Spreader)	31	1	1
Right Fork "	28	28	-	-	-	35	15	0	0
Main Creek	Sept 4, 39	Sept 5, 39	5 +	+	+	11	7	0	0
Right Fork	4	5	6 +	+	+	30	3	0	0
Left Fork	4	5	5 +	+	+	100	150	0	0
Main Creek at mouth	12	12	4 +	+	+	40	100	0	0
Right Creek "	12	12	4 +	+	+	15	20	0	0
Left Creek "	12	12	4 +	+	+	33	30	0	0
	12	12	4 +	+	+	19	27	0	0

BACTERIAL ANALYSIS OF CITY WATER

BOTTLE	DATE TAKEN	DATE PLATED	(10 C.C. C. CONFIRMATION)	TOTAL COUNT			COUNT ON L.L.AGAR	ACID PRODUCERS PER C.C.
				B. COLI	37 DEGREES C L.C.C.			
Left Fork at mouth	Sept 21, 39	Sept 22, 39	5 +		1890	3 +	250	0
Main Creek "	21	22	6 +		1600	3 +	75	0
Right Fork "	21	22	6 +		1168	3 +	320	0
Right Creek	24	24	5	1	400	2 +	500	0
Left Creek	24	24	3		100	2 +	150	0
Main Creek	24	24	2		2500	-	1000	0
Left Creek	Oct. 3	Oct. 3	1 +		100	1 +	75	1
Main Creek	3	3	5 +	1 +	12	6 +	14	0
Right Creek	3	3	3 +	1 +	24	4 +	30	0
Left Fork	10	10	3 +		6	1 +	75	1
Main Creek	10	10	3 +		13	3 +	17	1
Right Creek	10	10	5 +		200	5 +	20	1
Left Fork	17	17	2 +		16	1 +	8	0
Main Creek	17	17	2 +		Spreader	-	14	0
Right Creek	17	17	1 +		8	-	7	0
Left Fork	19	19	4 +		65	1 +	9	0
Main Creek	19	19	5 +		(40 +)	4 +	6	1
					(Spreader)			
Right Creek	19	20	5 +		(10 +)	3 +	13	1
					(Spreader)			
Left Fork	23	23	4 +		13	4 +	10	0
Main Creek	23	23	5 +		50	2 +	13	0
Right Creek	23	23	4 +		100	3 +	?	?
Left Fork	25	25	1 +		12	1 +	12	0
Main Creek	25	25	1 +		22	-	4	0
Right Creek	25	25	2 +		12	1 +	13	0
Left Fork	27	27	5 +		*	5 +	(25)	1
							(Spreader)	

* Too many to count

BACTERIAL ANALYSIS OF CITY WATER

DATE	TIME	WATER PLATE	NO. C.C.	B. COLI	TOTAL COUNT		COUNT IN ACID PHOSPHATE	PER C.C.
					37 DEGREES	C. I.C.C.		
Main Creek	Oct. 27 1939	Oct. 27 1939	5 +	2 -	80	60	2	
Right Fork	" 27 "	" 27 "	5 +	5 -	50	60	3	
Left Fork	" 30 "	" 30 "	-	-	1	7	0	
Main Creek	" 30 "	" 30 "	-	-	6	5	0	
Right Fork	" 30 "	" 30 "	2 -	-	2	2	0	
Left Fork	Nov. 1 "	Nov. 1 "	-	-	3	7	0	
Main Creek	" 1 "	" 1 "	-	-	3	9	0	
Right Fork	" 1 "	" 1 "	-	-	5	(Spreader)	0	
Left Fork	" 3 "	" 3 "	2 +	-	3	7	0	
Main Creek	" 3 "	" 3 "	2 +	-	4	3	0	
Right Fork	" 3 "	" 3 "	2 +	-	6	4	0	
Left Fork	" 6 "	" 6 "	-	-	3	2	0	
Main Creek	" 6 "	" 6 "	3 +	1 +	17	30	0	
Right Fork	" 6 "	" 6 "	2 +	-	5	1	0	
Left Fork	" 8 "	" 8 "	-	-	(Spreader)	2	0	
Main Creek	" 8 "	" 8 "	2 +	-	2	4	0	
Right Fork	" 8 "	" 8 "	1 +	-	2	3	0	
Left Fork	" 10 "	" 10 "	3 +	-	5	1	0	
Main Creek	" 10 "	" 10 "	1 +	-	2	1	0	
Right Fork	" 10 "	" 10 "	3 +	-	2	3	0	
Left Fork	" 22 "	" 22 "	2 +	2 +	10	1	0	
Main Creek	" 22 "	" 22 "	1 +	1 +	3	1	0	
Right Fork	" 22 "	" 22 "	2 +	2 +	1	2	0	
Left Fork	" 24 "	" 24 "	-	-	1	2	1	
Main Creek	" 24 "	" 24 "	1 +	1 +	2	0		

BACTERIAL ANALYSIS OF CITY WATER

DATE	TIME	DATE PLATED	(10 C.C.)	5. C O L I	1 C.C. CONJUGATION	TOTAL COUNT	
						37 DEGREES C. I.C.C.	COUNT ON ACID PHOSPHORIC L.I. AGAR PER C.C.
Pl. Fork		Nov. 24 1939	Nov. 24, 1939	1+			
Left Fork		" 23 "	" 22 "	+	+	2	0
Main Creek		" 23 "	" 26 "	-	+	4	0
Right Fork		" 23 "	" 26 "	+	-	2	0
Right Fork mouth		Dec. 4 "	Dec. 5 "	-	-	3	0
Left Fork		" 4 "	" 5 "	-	-	1	0
Main Creek at Right Fork		" 4 "	" 5 "	-	-	2	0
Right Fork at mouth		" 6 "	Dec. 8 "	+	NC	0	0
Main Creek at right fork		" 6 "	" 8 "	3+	NC	7	0
Left Fork at mouth		" 6 "	" 8 "	3+	NC	2	0
Main Creek at right fork		" 11 "	" 11 "	3+	NC	3	0
Mouth Left Fork		" 11 "	" 11 "	1-	NC	7	0
Mouth Right Fork		" 11 "	" 11 "	-	-	11	0
Main Creek Right Fork		Jan. 22 1940	22 1940	-	-	9	0
Left Fork at mouth		" 22 "	" 22 "	-	-	0	0
Right Fork "		" 22 "	" 22 "	-	-	1	0
Mouth Right Fork		Mar. 8 "	" 11 "	-	-	2	0
Mouth Left Fork		" 8 "	" 11 "	-	-	2	0
Mouth Main Creek		" 8 "	" 11 "	-	-	3	0
Left Fork at mouth		" 18 "	" 19 "	-	-	6	0
Main Creek		" 18 "	" 19 "	-	-	1	0
Right Fork		" 19 "	" 19 "	-	-	0	0
Mouth Main Creek		" 29 "	" 29 "	-	NC	1	0
Left Fork		" 29 "	" 29 "	-	-	2	0
Main Creek		Apr. 21 "	" 21 "	-	-	13	0
						24	0

BACTERIAL ANALYSIS OF CITY WATER

S.E. TREE	DATE TAKEN	DATE PLATED	(10 C.C. I C.C. CONFIRMATION)	TOTAL COUNT			COUNT ON ACID PRODUCERS
				37 DEGREES C I.C.C.	L.I. AGAR	PER C.C.	
Right Fork	Apr. 22, 40	Apr. 22, 40	-	4	2	0	0
Left Fork	22	22	2 +	4	2	0	0
Main Creek at mouth	29	30	4	13	9	0	0
Left Fork "	29	30		7	6	0	0
Right Fork "	29	30	2 +	18	5	0	0
Left Fork "	May 6, 40	May 7, 40		1	3	0	0
Main Creek "	6	7		2	6	0	0
Right Fork "	6	7		4	2	0	0
Right Fork "	14	15		30	35	0	0
Left Fork "	14	15		20	22	0	0
Main Creek "	14	15		2	18	0	0
Left Fork "	27	27		13	18	0	0
Right Fork "	27	27		24	6	0	0
Main Creek "	27	27		18	14	0	0
Right Fork "	Jun. 10, 40	Jun. 11, 40	3 +	200	13	1	1
Left Fork "	10	11	+	150	92	0	0
Main "	10	11	+	325	100	0	0
Left Fork "	19	20	5 +	600	400	0	0
Main Creek "	19	20	3 +	400	400	0	0
Right Fork "	19	20	4 +	1200	600	0	0
Right Fork "	Jul. 23, 40	Jul. 23, 40	-	45	20	0	0
Main Creek "	23	23	2 +	26	50	5	5
Left Creek "	23	23	-	32	60	4	4
Main Creek "	25	26	3 +	800	500	4	4
Left Fork "	25	26	2 +	700	75	0	0
Right Fork "	25	26	5 +	300	300	50	50

BACTERIAL ANALYSIS OF CITY WATER

SOURCE-NORTH FORK	DATE TAKEN	DATE PLATED	B. C O L I (10 C.C. 1 C.C. CONFIRMATION)		TOTAL COUNT 37 DIAGNOSIS C 1.C.C.	COUNT ON L.L. AGAR	ACID PRODUCERS PER C.C.
Left Fork at intake	Jul. 18, 1939	Jul. 18, 1939	5 +	-	*	6400	0
Right Fork	18	18	5 +	-	2800	1920	0
Long Branch	18	18	2 +	-	1600	1200	0
Left Fork	24	25	1 +	NC	800	400	0
Right Fork	24	25	4 +	NC	3000	2000	0
Long Branch	24	25	2 +	NC	2000	1000	0
Left Fork	31	Aug. 1	-	-	3200	1250	0
Right Fork	31	1	1 +	-	10000	4860	0
Long Branch	31	1	3 +	-	1500	500	0
Left Fork	Aug. 7	8	1 +	-	235	182	0
Right Fork	7	8	3 +	-	3200	960	0
Long Branch	7	8	3 +	1 +	12800	9600	0
Left Fork	14	15	3 +	3 +	63	38	0
Right Fork	14	15	2 +	-	100*	48	0
Long Branch	14	15	-	-	6	10	0
Left Fork at intake	28	28	-	-	15	1	0
Right Fork	28	28	-	-	4	12	1
Long Branch	28	28	-	-	15	13	0
North Fork L. Branch Sep 4	28	28	4 +	2 +	6	6	0
" " R. " 4	4	Sept. 5	6 +	1 +	15	7	0
" " L. " 4	4	5	3 +	1 +	9	30	0
Long Branch at intake	12	12	3 +	0	16	Spreader	0
Right Fork	12	12	5 +	4 +	0	5	0
Left Fork	12	12	4 +	2 +	6	6	0
Left Fork	21	22	5 +	3 +	1920	432	0
Right Fork	21	22	6 +	2 +	2560	175	0

88202A

* Spreader

BACTERIAL ANALYSIS OF CITY WATER

SOURCE-NORTH FORK	DATE TAKEN	DATE PLATED	(10 C.C. 1 C.C. CONFIRMATION)	B. C O L I	TOTAL COUNT 37 DEGREES C I.C.C.	COUNT ON L.L.AGAR	ACID PRODUCERS PER C.C.
Long Branch at intake	21	Sept. 22, 1939	6 +	3 +	40	42	0
Long Branch	24	24	1	-	30	(10 +) (Spreader)	0
Right Fork	24	24	3	4 +	300	500	0
Left Fork	24	24	2	1 +	25	15	0
Long Branch	3	3	3 +	1 +	60	45	0
Right Fork	3	3	4 +	2 +	50	50	1
Left Fork	3	3	5 +	5 +	25	50	1
Long Branch	10	10	2 +	1 +	350	*	
Right Fork	10	10	4 +	4 +	200	75 +	Spreader
Left Fork	10	10	-	-	Spreader	Spreader	
Long Branch	16	17	2 +	2 +	11	5	0
Right Fork	16	17	2 +	-	8	6	0
Left Fork	16	17	1 +	1 +	42	11	0
Long Branch	19	20	2 +	2 +	200	73	1
Right Fork	19	20	5 +	4 +	20	3	1
Left Fork	23	20	4 +	-	55	6	0
Long Branch	23	23	-	-	30	?	?
Right Creek	23	23	2 +	-	21	?	?
Left Fork	25	25	1 +	1 +	15	8	1
Long Branch	25	25	1 +	1 +	15	16	0
Right Fork	25	25	4 +	1 +	19	13	0
Left Fork	30	25	1 +	1 +	33	19	0
Long Branch	30	30	-	-	3	14	0
Right Fork	30	30	3 +	-	4	7	0
	30	30	3 +	-	3	5	0

BACTERIAL ANALYSIS OF CITY WATER

SOURCE-NORTH FORK	DATE TAKEN	DATE PLATED	B. C O L I		TOTAL COUNT	COUNT ON	ACID PRODUCERS
			(10 C.C. 1 C.C. CO. CONFIRMATION)		37 DEGREES C 1 C.C.	L.L. AGAR	PER C.C.
Left Fork	Nov. 6, 1939	Nov. 6, 1939	-	-	1	4	0
Long Branch	6	6	-	-	6	4	0
Right Fork	6	6	-	-	1	2	0
Left Fork	8	8	-	-	1	6	0
Long Branch	8	8	-	-	6	3	0
Right Fork	8	8	-	-	4	9	0
Left Fork at intake	10	10	1+	-	4	1	0
Long Branch	10	10	1+	-	4	5	0
Right Fork	10	10	3+	-	1	2	0
Left Fork	22	22	5+	5+	2	0	0
Longs Branch	22	22	1+	1+	1	3	0
Right Fork	22	22	2+	1+	5	1	0
			1+	1+	(Spreader- (3)		
Left Fork	24	24	-	-	1	4	0
Longs Branch	24	24	1+	+	0	0	0
Right Fork	24	24	-	-	3	1	0
Left Fork	28	28	-	-	1	1	0
Longs Branch	28	28	-	-	1	1	0
Right Fork	28	28	-	-	1	2	0
Longs Branch at intake	4 Dec.	5 Dec.	-	-	9	5	0
Right Fork	"	5	-	-	1	0	0
Left Fork	"	5	-	-	1	2	0
Right Fork	"	5	+	+	1	1	0
Longs Branch	"	7	-	-	1	0	0
Left Fork	"	7	+	+	3	0	0
Longs Branch	"	7	-	-	0	0	0
Left Fork	"	8	-	-	6	4	0
Longs Branch	"	8	+	+			

BACTERIAL ANALYSIS OF CITY WATER

SAMPLING PLACE	DATE TAKEN	DATE PLATED	E. COLI		TOTAL COUNT	COUNT ON L.I.C. / C.P.R.	ACID PRODUCERS P.P.C.C.
			(10 C.C.)	(1 C.C. COAGULATION)			
Left Fork at Intake	Dec. 8, 1939	Dec. 8, 1939	-	-	2	2	0
Right Fork "	" 8	" 8	-	-	2	2	0
Longs Branch "	" 11	" 11	-	-	2	2	0
Left Fork "	" 11	" 11	-	-	13	10	0
Right Fork "	" 11	" 11	-	-	2	10	0
Left Fork "	" 11	" 11	-	-	1	1	0
Longs Branch at mouth	Jan 22	Jan. 22	-	-	2	0	0
Left Fork at intake	" 22	" 22	-	-	1	0	0
Right Fork "	" 22	" 22	-	-	13	0	0
Left Fork "	Mar. 8	Mar. 11	-	-	4	0	0
Broth Fork "	" 8	" 11	-	-	8	3	0
Left Fork at Intake	" 8	" 11	-	-	3	3	0
Right Fork "	" 29	" 29	-	-	7	7	0
Longs Branch "	" 29	" 29	-	-	7	0	0
Right Fork "	" 29	" 29	-	-	3	13	3
Longs Branch "	" 4	Apr. 5	-	-	2	20	0
Left Fork "	" 4	" 5	-	-	3	3	0
Right Fork "	" 4	" 5	-	-	5	3	0
Left Fork "	" 22	" 22	-	-	7	0	0
Longs Branch "	" 22	" 22	-	-	3	0	0
Left Fork at Intake	" 29	" 29	-	-	16	2	0
Right Fork "	" 29	" 29	-	-	14	9	1
Longs Branch "	" 29	" 29	-	-	16	23	0
Right Fork "	" 29	" 29	-	-	2,000	11	0
Longs Branch "	" 29	" 29	-	-	2,000	8	0
Left Fork "	" 13	" 13	-	-	120	90	0
Right Fork "	" 13	" 13	-	-	4	3	0
Left Fork "	" 13	" 13	-	-	1,000	50	0

Agar medium

BACTERIAL ANALYSIS OF CITY WATER

<u>SOURCE-NORTH FORK</u>	<u>DATE TAKEN</u>	<u>DATE PLATED</u>	<u>B. C O L I</u> <u>(10 C.C. 1 C.C. CONFIRMATION)</u>	<u>TOTAL COUNT</u> <u>37 DEGREES</u> <u>C 1.C.C.</u>	<u>COUNT ON</u> <u>I.L.AGAR</u>	<u>ACID PRODUCERS</u> <u>PER C.C.</u>
Left Fork at intake	Jul. 2, 1940	Jul. 3, 1940	4 +	800	400	0
Longs Branch	2	3	+	240	140	0
Right Fork	2	3		2,000	1,000	0
Right Fork	22	23	-	600	140	0
Longs Branch	22	23	4 +	180	80	0
Left Fork	22	23	2 +	1,400	600	0

BACTERIAL ANALYSIS OF CITY WATER

B. C. C. I.

CITY TANK DATE TAKEN DATE PLATED (10 C.C. 1. C.C. CONFIRMATION) TOTAL COUNT 37 DEGREES C.1 C.C. COUNT IN L.L. ACID ACID PRECIPITATE PER C.C.

"	"	July 25, 1939	July 25.	4 +	NC	65	7	0
"	"	Aug. 29 1939	" 28.			12	2	0
"	"	Sept. 6 1939	Sept. 7			0	0	0
"	"	" 13 "	" 13	-	-	2	25	0
"	"	Oct. 17 "	" 17	-	-	5	20	0
"	"	Nov. 21 "	" 21			19	10	0
"	"	" 23 "	" 23			0	1	0
"	"	" 23 "	" 23			0	1	1

OPERATION OF CARS AND TRUCKS

On the following page is a tabulation showing the motor equipment operated by the water department. From the tabulation, it will be seen that the cars and trucks were operated at a cost of, for fuel and parts, less than two cents per mile. The cost of depreciation, garage labor and overhead, were not included in the cost of maintenance. The total rental charged by the motor transport department was \$3,744.00 but the cost of maintenance was, exclusive of depreciation, labor and overhead, \$3,094.18.

Two of the oldest cars, number 967 and 975, are 1930 Ford Coupes. These cars are constantly in service and travel 12,000 to 19,000 miles annually. They depreciated to such an extent that it is believed that it will not be economical to operate them much longer. Truck number 938, a 1935 Dodge, is also in poor condition and should be replaced as soon as funds are available.



Interior of tunnel beneath Bee
Tree Dam showing 42 inch steel
pipe line.

COST OF OPERATION OF CARS AND TRUCKS.

<u>CAR NO.</u>	<u>TYPE OF EQUIPMENT</u>	<u>DRIVER</u>	<u>COST OF MAINTENANCE</u>	<u>ESTIMATED DISTANCE TRAVELLED</u>	<u>COST-CENT PER MILE</u>	<u>RENTAL COST</u>
#934	'37 Chev. 1/2 ton pick up	D.A. Kanpp	\$586.93	33,000	1.95	\$374.40
#935	'38 Dodge Coupe	R.L. Maynard	68.69	5,595	1.23	374.40
#936	'36 Plymouth Coupe	W. B. Cody	428.26	27,345	1.57	374.40
#937	'32 Chev. 1/2 ton pick up	Lee Nash	329.47	24,675	1.34	374.40
#938	'35 Dodge 1/2 " "	George Green	450.93	24,825	1.70	374.40
#939	'37 Chev. 1/2 " "	W. J. Parks	243.19	16,665	1.46	374.40
#940	'37 " Coupe	Frank Campbell	202.64	15,105	1.34	374.40
#947	'30 Ford Coupe	Dewey Hudgins	164.78	11,770	1.40	374.40
#991	'35 Chev. "	Gus Mathews	296.83	21,300	1.36	374.40
#975	'30 Ford "	Thad Adams	358.46	19,000	1.89	374.40
			<u>\$5094.18</u>			<u>\$3,744.00</u>

Note: Depreciation and garage labor and overhead are not included in cost.

FIRE FLOW TESTS

The National Board of Fire Underwriters in 1936 made tests of the pressure and amount of discharge from various fire hydrants throughout the city. The tests show many interesting results. Consequently, the tabulation published by the board is repeated on the following page.

The Water Department has frequent requests for information regarding the pressure in various parts of the city, particularly is this true in the business districts where new stores or business firms are planning to operate. Both the pressure and the volume in the business districts was found to be generally very good. In the mercantile and residential districts too, the pressure was found to be ample except in a few isolated places. There are, however, many places in the city where there is insufficient fire protection. The Chief of the Fire Department has recommended installation of hydrants in many places but the department is without funds for the installation.

FIRE HYDRANTS--FIRE FLOW TESTS

Number and Location of Group	Discharge		Pressure		Quality			
	Gallons Per Minute	Individual Hydrants	Total of Group	Hydrants Closed	Hydrants Open	Required Available		
(1. College St and Broadway	960	1220	1680	3860	99	85	6500	10000
(2. Market and Eagle Strs	590	660	1200	2450	110	100	6500	8000
(3. Roberts St and Patton Ave	580	580	580	1740	171	104	3500	2700
(4. Depot and Bartlett Strs	610	640	750	2000	186	89	4000	2700
(5. Haywood Rd & Richmond Ave	450	480	490	1420	109	50	3000	1800
(6. Haywood St & Montford Ave	500	610	770	1880	94	66	3000	3200
(7. Broad St & Washington Rd	530	620	640	1790	90	35	2500	2000
(8. Macon Ave and Glendale Rd	590	590	840	1430	98	55	2000	2000
(9. Watauga St and Pearson Dr	120	280	440	840	117	3	2000	800+
(10. Gracelynn Rd & Woodvale	290	530	570	1390	95	62	2000	2200
(11. Midland Dr & Euclid Blvd	480	480	570	1050	111	29	1500	1100
(12. S. Grove and Silver Strs	440	480	620	1540	159	76	2000	2000
(13. Kenilworth Dr & Lenoir St	290	290	480	770	110	26	2000	800
(14. Truckway St W. of Elliott St	520	560	560	1080	185	36	3500	1100
(15. Short and Angle St	390	390	520	1300	173	17	2000	1300
(16. Brookshire & Fairview	410	780	780	1190	91	28	1500	1300
(17. Haywood Rd & Vermont Ave	420	480	550	1450	103	25	2500	1500
(18. Rumbough Pl & Harris St	520	590	590	110	137	69	1500	1500
(19. Mitchell & Craggy Aves	250	400	400	650	103	2	1500	600
(20. Westchester Dr & Chiles Ave	160	230	230	390	115	19	1500	400

PROJECTS COMPLETED

New construction during the year was limited because no funds were provided in the budget for the extension of water lines or sewers.

One project, constructed by Reed & Abee under contract with Beacon Manufacturing Co., included an 8" cast iron main from the County 8" main in the Black Mountain highway across the Swamanoa River to the Beacon village and plant. This pipe line costing \$2,057.48 will serve about 200 houses in the village and provide domestic water for the plant. During droughts when the company's own industrial supply dwindles, the Beacon Manufacturing Co. will draw on the city's supply.

Only one construction project of consequence is now under way. W.P.A. forces are engaged in the construction of a 10" cast iron water main extending from the 16" main 3,400' up Sugar Fork Creek where an

intake dam is being constructed. When the dam and intake is completed, the stream flow from 2.86 square miles of drainage area will be added to our water shed.

The pipe line will provide two million gallons when the water is available, but the flow of the stream will drop, during the very driest periods, to approximately 0.5 million gallons per day.

Besides the pipe line under construction, the project includes the installation of approximately 350 Ft. of 6" pipe line leading from the intake on the left fork of the North Fork stream, to a small intake which will be constructed on the Gombron Branch.

This installation will add 1.86 square miles to the drainage area supplying water for the Asheville System. Included in the project is the filling of the top of Bee Tree Dam which has settled approximately 18" at a point 300' east of the spill way. Although

the settlement is a result of natural causes and not more than might be expected in so large a dam, it is advisable to raise the top of the dam to its original elevation to guard against the possibility of flood water over topping the dam. After the filling is completed, the entire area at the top of the dam should be paved as a precaution against saturation of the dirt during heavy rains. The saturated earth might cause slides which would bring about serious damage to the huge structure.

In addition to the back filling at the top of the dam, it is planned to construct a low wing wall near the west end of the Bee Tree spill way to preclude the possibility of flood water eroding the east end of the spill way. Another means of enlarging the spill way area so that greater discharge would be possible during flood periods will be to cut off part of the concrete crest of the upper section of the spill way. This section is four feet higher than the lower spill



Top of Beaucatcher concrete reservoir.



Top of Bee Tree Dam looking westward.

way where the normal over flow is discharged but there is no necessity for so much difference in elevation of the two spillways except to make short and high flash boards possible.

WATER SUPPLY

With the passage of years, the conditions surrounding our water sheds have been gradually changing. It was not many years ago that practically all of the drainage area above our intakes was virgin forest far from human habitation. Then it was a comparatively simple matter for wardens to protect our water shed from encroachment by the hunters, fishermen or other trespassers. Each year the settlement of man has drawn closer to the water sheds. Now there are under construction two sections of Federal Highway along the rim of the mountains which comprise our water sheds.

Two contractors, employing hundreds of men, are building a natural road way extending twelve miles on the drainage area. It has been necessary to employ four wardens to regulate the sanitary precautions taken by both the contractors. Because the

workmen are scattered over many miles of road way, it is obviously impossible for the wardens to keep watch of every man on the job. No matter how vigilant the wardens may be, there is considerable danger that our water system may become contaminated by the workmen on the road way. The contractors on the Bee Tree section of the highway employ a crew of approximately fifty men each night drilling a tunnel through the mountainside. Another warden should be employed to keep close inspection of the action of these men. Fortunately, there has been no great increase in the bacteria count in the water samples so far, but following rains the turbidity has increased noticeably. When the construction of the road way is completed, the workmen will go away but in their place will be hundreds of motorists traveling the scenic highway. Consequently, we will probably be faced with the necessity for patrolling the road as long as the water shed and the road way are in existence.

During September, rain-fall at the water sheds rapidly decreased and a severe drought, extending into January, set in. The stream flows fell off until it became necessary to draw heavily from the water stored in the Bee Tree reservoir. The surface of the reservoir gradually went down until it was thirty feet below the elevation of the top of the flash boards. On February 9, there were left only about 250,000 gallons in the reservoir. Of the remaining amount, it is estimated that about 150 million gallons were of good quality. More than that might have been used even though there were objectionable tastes or odors in the water.

Although the drought was severe, the reservoir fully supplied all the demands by our customers. In the dry season, the margin of safety became dangerously low. Only about twenty-five per cent of the stored water was available when the reservoir refilled.



Entrance to Blue Ridge Parkway at Craggy Gardens.



Ranger's cabin and parking lot at Craggy Gardens.

In the design of bridges, buildings and other structures involving human life, it is customary for all designers to allow a factor of safety of not less than three. This is done because of the uncertainty of the strength of the materials entering into the structure and many other indeterminate factors involving its safety. Obviously, in the case of our water supply, the factor of safety of 1/4 is insufficient especially when it is considered that water, one of the vital needs of humanity, is under consideration. The forces of nature are far less predictable than are the strength of materials and other factors entering into the building construction. We, therefore, again emphasize the need of planning for additional water storage at North Fork.

The exceptionally dry season last fall brought about another menace to our water sheds. Some of the most serious fires in the history of the water shed broke out and spread upon the city property

below the intakes. Many acres of property were burned despite the efforts of several hundred men employed to combat the flames. The Forestry Department, the CCC Camps and other governmental agencies co-operated in an effort to keep the fires under control but other fires were raging in many forests throughout Western North Carolina so that the greater part of the burden was borne by untrained men hastily picked up to meet the emergency. The fires were confined to the area below the intakes with the exception of a small area of approximately an acre at the top of the ridge between Bee Tree and North Fork. Although a great deal of damage was done to the timber on city property, an estimate of the amount of damage has not been made. To extinguish the fires, approximately five thousand dollars were expended.

Every dry year brings new threats of fires and it is possible for them to do irreparable damage

to the water sheds. To guard against recurrence of conflagrations, it is recommended that all the wardens be given a training course under a qualified forester so that they will be able to lead untrained men into the areas threatened by fire and quickly quell them. Fire lines should be kept cleared around the water shed and in addition new lines should be cut in strategic positions through the city property following streams, tops of ridges, clearings or other natural boundaries. The areas thus divided will be much more easily protected if fires break out. During the fire season, additional wardens should be employed to patrol the water shed in order to keep out poachers who might start a fire. They might also more quickly discover fires which have been started and communicate the information to headquarters.

At both of the water sheds, detailed hydrographic data are kept. More complete and detailed records are now kept than ever before. All of the data

are compiled and comprehensibly presented each year in a report filed by Consulting Engineer Charles E. Waddell, consequently, the tabulation covering this fiscal year will not be included in this report.

On page 98 will be a table showing the yearly rainfall and runoff at each of the water sheds. It will be noted that there were several years during which the rainfall and runoff were less than during the drought year of 1939, but the rains in other years were more evenly distributed and no water shortage threatened.

A second table shown on page 99 will show the total amount of water delivered to our system during each of the past twelve years. On the same table will be shown the total amount that the system, as it stands now, would have yielded during the same period. In 1930 the rainfall and runoff and yield were much less than in 1939 yet the reservoir surface did not approach the low stage reached in 1939. This raises the question what may happen if we have a drier year than 1930 with the rainfall distributed as it was in 1939.

YEARLY RAINFALL AND RUNOFF
AT WATERSHED

NORTH FORK

SEE TREE

<u>YEAR</u>	<u>RAINFALL</u>	<u>RUNOFF</u>	<u>RAINFALL AT DAM</u>	<u>RAINFALL AT F.R.K.</u>	<u>RUNOFF</u>
1926	56.00	25.63	42.95		17.82
1927	46.78	26.01	39.17		22.38
1928	66.55	43.53	35.78		33.75
1929	88.01	53.13	60.52		42.87
1930	35.99	19.11	30.73		15.29
1931	50.72	21.93	35.00		18.99
1932	66.27	36.56	48.13		26.42
1933	38.83	24.40	35.68		19.60
1934	61.94	32.87	45.84		17.27
1935	54.39	19.96	43.17		22.39
1936	75.95	44.34	56.58	68.60	37.22
1937	56.56	34.55	43.27	56.21	29.29
1938	45.95	27.34	43.22	45.13	22.85
1939	50.08	26.13	43.88	39.66	23.33

DEMAND AND YIELD OF SUPPLY SYSTEM

YEAR	TOTAL DELIVERED TO SYSTEM	TOTAL YIELD	
	M.G.D.	PRESENT SYSTEM	
		M.G.D.	
1928	7.41	14.0	(20.4)
1929	6.91	14.0	(20.6)
1930	6.21	9.3	
1931	5.14	12.0	
1932	5.44	12.1	
1933	5.48	10.2	
1934	5.25	14.0	(14.2)
1935	6.08	14.0	
1936	7.17	13.2	
1937	7.33	14.0	(15.8)
1938	6.43	14.0	
1939	6.28	11.3	

Note: Figures in parenthesis represent the total yield at the water sheds but the delivery is limited to the carrying capacity of the supply mains. This amount is estimated to be about 14.0 M.G.D.

METROPOLITAN WATER DISTRICT

In his report, Consulting Engineer, Chas. E. Waddell has advocated the creation of a Metropolitan Water District embracing Asheville and its environs. This suggestion seems to be the most practical solution of a troublesome problem - the operation of separate city and county water departments.

Under the present working agreement, consumers requesting new connections outside of the city limits make application to the County Water Department and the installation is made by the county. The city water department reads the meters and collects for the water consumed. This method has worked with comparative success during the past year as a result of genuine co-operation on the part of the two departments, but, as Dr. Waddell has so aptly pointed out in his report, the same co-operation might not prevail during future administrations.

Since the cost of maintenance of the water lines and meters in the county is borne by the county and the revenue is received by the city, it has been claimed that the city should reimburse the county for the maintenance expense.

Although it is true that the city does derive some revenue from the county consumers, the cost of reading, billing and collecting is much greater in the county than it is in the city. Moreover, the cost of amortization of the bonds for water sheds, reservoirs and supply lines is all carried by the city. A part of this cost, plus a share of a fund for maintenance, depreciation, obsolescence and repairs of the supply system should be carried by the county. It is estimated that these items would cost more than the actual cost of the maintenance of the lines.

The City of Asheville purchased land, built dams and reservoirs, and constructed costly supply mains to furnish its own citizens with water. This was an



Protective cribbing along North Fork road way
to prevent flood damage.

WHITE FAWN RESERVOIR



Showing aeration nozzles.
Capacity 11 million gallons.

enterprise in which the county did not share, consequently, there is no particular reason why the county should participate in the profits of the business. We are, of course, delighted to have the county consumers, but it does not necessarily follow that the county should have benefits greater than or equal to those enjoyed by the city tax payers.

Under the present arrangement, the city water department receives many complaints from county consumers. These complaints are relayed to the county water department which makes the necessary repairs. However, all adjustments of bills resulting from faulty meters or lack of service must be borne by the city. Sometimes county meters are not serviced for many months with resultant loss of revenue to the city.

Due to the fact that the county receives no revenue from the operations of the water department, it is believed that there is less incentive to provide the highest type of service than would be the case if the same department maintained the lines and received

the revenue. It is probable that economy of operation might be effected by combining the work of the separate departments under one organization. A division of responsibility in general results in less efficiency than when the entire responsibility is delegated to one department. Since about thirteen per cent of the total meters are attached to the county lines, let us use that as a basis for a rough approximation of the fair division of the cost of supplying water to the county consumers.

Below are the principle items entering into the cost of operating the water department together with what is believed to be the county's fair proportion of the expense.

<u>ITEM</u>	<u>ANNUAL COST</u>	<u>COUNTY'S SHARE PERCENTAGE</u>	<u>SHARE AMOUNT</u>
Maintenance of water sheds	\$ 16,061.01	13	\$ 2,087.93
Amortization of water bonds	200,000.00	13	26,000.00
Depreciation & Obsolescence of water sheds	35,000.00	13	4,550.00
Maintenance of county lines	14,600.00	100	14,600.00
County meter reader	1,694.40	100	<u>1,694.00</u>
			\$ 48,932.33

It will be noted that no part of the administrative costs, such as billing, collecting, superintendence, insurance or other similar items are listed as a part of the county's share, yet the total amount \$48,932.33, is more than thirteen per cent of the net revenues of the water department for the 1939-40 fiscal year.

Since it is unlikely that the county can be prevailed upon to turn over to the city the suggested total of \$48,932.33 and since the act of legislature makes no provision for the collection of that amount from the county, it is our opinion that the city would be benefited by operating the entire city and county water departments if the county would turn over to the city the amount it pays annually for the maintenance of county water mains alone. This amount, \$14,600.00, would be ample for the city to maintain the lines and the county could continue to levy taxes upon the various water districts for the full amount granted to the city.

SUMMARY OF RECOMMENDED IMPROVEMENTS

To summarize the more important measures which should be taken to guarantee uninterrupted water service to our consumers, the ten principle recommendations for improvement made in this and in previous reports will be listed below:

1. Prepare plans for increased storage at North Fork.
2. Build retaining wall and drains to prevent slides at White Fawn Reservoir.
3. Lower shallow pipe lines in distribution system.
4. Refill depression caused by settlement at top of Bee Tree Dam. Pave top of dam and provide surface drainage.
5. Enlarge the spill way at Bee Tree.
6. Construct bridge across spill way at Bee Tree Dam.
7. Cut fire lines to divide water sheds into segments.
8. Construct settling basins at North Fork.
9. Straighten and enlarge channels at Bee Tree Creek and North Fork
10. Create Metropolitan Water District.

It is a pleasure to state that all the members of the Water Department have shown splendid loyalty and co-operation. During emergencies, they have worked long hours dilligently and uncomplainingly. Each member has endeavored to the best of his ability to render prompt, efficient and intelligent service to the public.

Respectfully submitted,

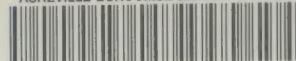
R. L. Maynard

R. L. Maynard

Director



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